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91-e13

Waterbody No. WA-57-1010
Segment No. 24-54-01

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
7171 Cleanwater Lane, Building 8, LH-14 • Olympia, Washington 98504-6814

November 8, 1991

TO: Roger Ray and Patrick Hallinan, ERO

FROM: Norm Glenn and Tom Nell, EILS/WAS

SUBJECT: Kaiser Aluminum and Chemical Corporation-Trentwood, Class II Inspection

## ABSTRACT

Ecology conducted a Class II Inspection at Kaiser Aluminum and Chemical Corporation, Trentwood, Washington, on May 21-23, 1990. Kaiser operates an aluminum rolling mill and metal finishing plant. Kaiser is permitted to discharge wastewater to the Spokane River as regulated by NPDES permit number WA-000089-2. Wastewater generated at Kaiser is discharged to the river through a four million gallon wastewater lagoon. The influent to the lagoon consists of effluent from industrial and domestic wastewater treatment (DWT) facilities, and contact and non-contact cooling water.

Kaiser was operating within the permit limits except for oil and grease samples collected from the lagoon discharge. A moderate removal efficiency of TSS, $BOD_5$, and COD was realized in the domestic wastewater treatment facility; lead concentrations were somewhat elevated.

Effluent from the industrial wastewater treatment facility was high in solids, chromium$^{+6}$ and copper and moderately high in selenium. Industrial wastewater effluent to the lagoon caused 100% mortality in all four bioassays, both acute and chronic, indicating the presence of toxicity. Kaiser has added multi-media filtration since the inspection.

No significant quantities of organic compounds were found in any of the sampled waste streams.

# INTRODUCTION

Ecology conducted a Class II Inspection at Kaiser Aluminum and Chemical Corporation (Kaiser), Trentwood, Washington, on May 21-23, 1990. Roger Ray of the Eastern Regional Office (ERO) requested the inspection. Pat Hallinan of the Environmental Investigations and Laboratory Services Program (EILS) conducted the inspection. Patrick Blau, Senior Environmental Engineer at Kaiser, provided on-site assistance. Tom Nell and Norm Glenn of EILS analyzed and interpreted laboratory data and wrote this report.

Objectives of the inspection were to:

1. Characterize Kaiser's intake water (Spokane River water) for selected general chemistry and priority pollutant parameters;

2. Characterize influents (treated industrial wastewater, treated domestic wastewater, and cooling water) to the wastewater lagoon;

3. Characterize effluent from the wastewater lagoon;

4. Verify compliance with NPDES permit limits;

5. Assess toxicity of intake water, treated industrial wastewater, and wastewater lagoon effluent using a bioassay;

6. Evaluate the permittee's sampling and flow measurement procedure using sample splits; and

7. Progress Ecology's research on the effectiveness of centrifugation.

## Description and Location

The aluminum rolling mill and metal finishing plant was originally built in 1945. It operates continuously and employs about 1500 people. The primary products include aluminum coil, sheet, and plate. Aluminum is re-melted and formed into ingots as part of the manufacturing process. Three hot rolling mills are used to form coil, sheet, and plate followed by five cold rolling mills to acquire further reduction in thickness. Finishing operations involve degreasing, conversion coating, and painting. Figure 1 is a location map.

Kaiser is permitted to discharge wastewater to the Spokane River under National Pollutant Discharge Elimination System (NPDES) waste discharge permit number WA-000089-2, issued in 1988. Wastewater is discharged to the Spokane River through a four million gallon wastewater lagoon (outfall 001). Influent to the lagoon consists of effluent from industrial wastewater treatment (IWT) and domestic wastewater treatment (DWT) facilities, and contact

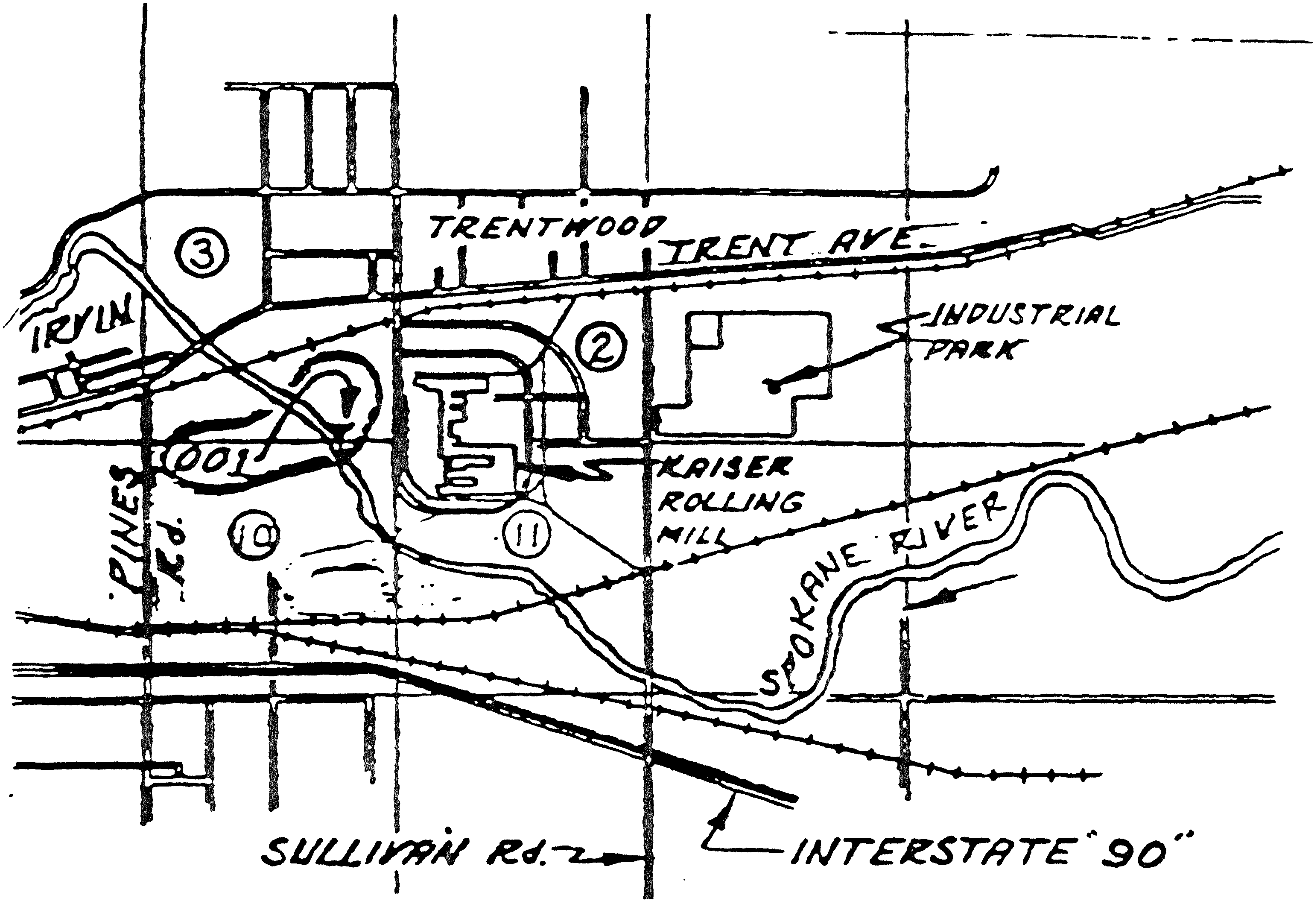



Figure 1. Location Map, Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

and non-contact cooling water. The IWT, DWT, and cooling water discharge locations are referred to as outfalls 002, 003, 004 and 005, respectively. The permit contains effluent limitations for outfalls 002 and 003, as well as 001. Figure 2 shows the treatment systems layout and wastewater flow regime.

Immediately after the permit was issued, Kaiser submitted documentation to establish that they could not, despite all reasonable best efforts, achieve several of the effluent limitations established for outfalls 001 and 002. Since these effluent limitations may not be waived or delayed, Ecology exercised its prosecutorial discretion by issuing Order No. DE 88-E248. The order provides for interim effluent limits during the schedule of compliance contained in the permit. These interim limits were in effect at the time of the inspection.

The IWT facility was designed to reduce the oil content, phosphorus, and chromium in the wastewater. This is achieved through a complex process. Acid-heat treatment demulsifies the oil-water emulsion. This demulsified mixture is separated by gravity. The reclaimed oil is sent to a local oil refining facility for further processing. The water portion flows into the neutralization tank.

Hexavalent chrome waste is reduced by acid-sulfur dioxide reduction. Reduced chromium (trivalent) waste combines with the water portion from the acid-heat treatment in the neutralization tank. Untreated phosphate waste is also allowed to flow into the neutralization tank. Lime and polymer are added. Calcium hydroxide (lime) complexes with the chromium and phosphate ions and forms floc which settles to the bottom of the neutralization tank.

The settled matter (sludge) is dewatered in a drum vacuum filter and hauled to a local landfill. The effluent undergoes further settling in a clarifier and passes through a Parshall Flume into the wastewater lagoon. (A multi-media filtration system was installed after the date of the inspection to provide additional treatment for IWT discharge to the lagoon.) The IWT process layout is given in Figure 3.

The DWT facility is designed to reduce biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform. It consists of a primary clarifier, rock trickling filter, secondary clarifier, and chlorine disinfection. Effluent passes through a Parshall Flume before discharge to the lagoon. Sludge is digested and dried on-site. Figure 4 shows the layout of the DWT.

Cooling water is the largest contributor of flow to the lagoon. It is made up of both noncontact and contact cooling water. Runoff from floor, storm, and roof drains also discharge to the lagoon.

All wastewater produced at Kaiser is discharged to the lagoon before it passes through a rectangular weir and outfall to the Spokane River. The combined wastewater in the lagoon is treated only for oil removal. The separation and removal of oil is accomplished mainly with oil booms and a mechanical skimmer.

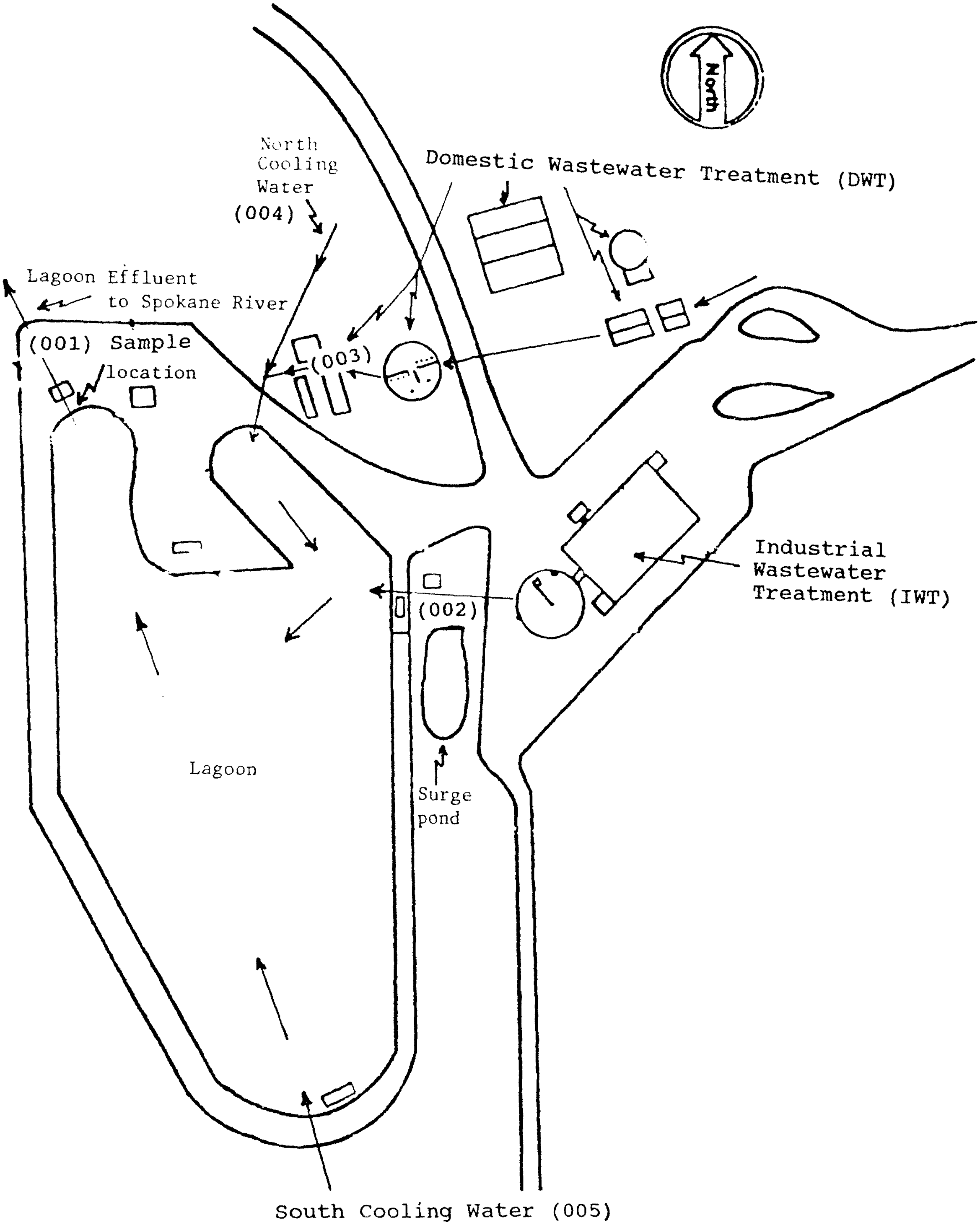



Figure 2. Wastewater Treatment Facilities Layout, Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

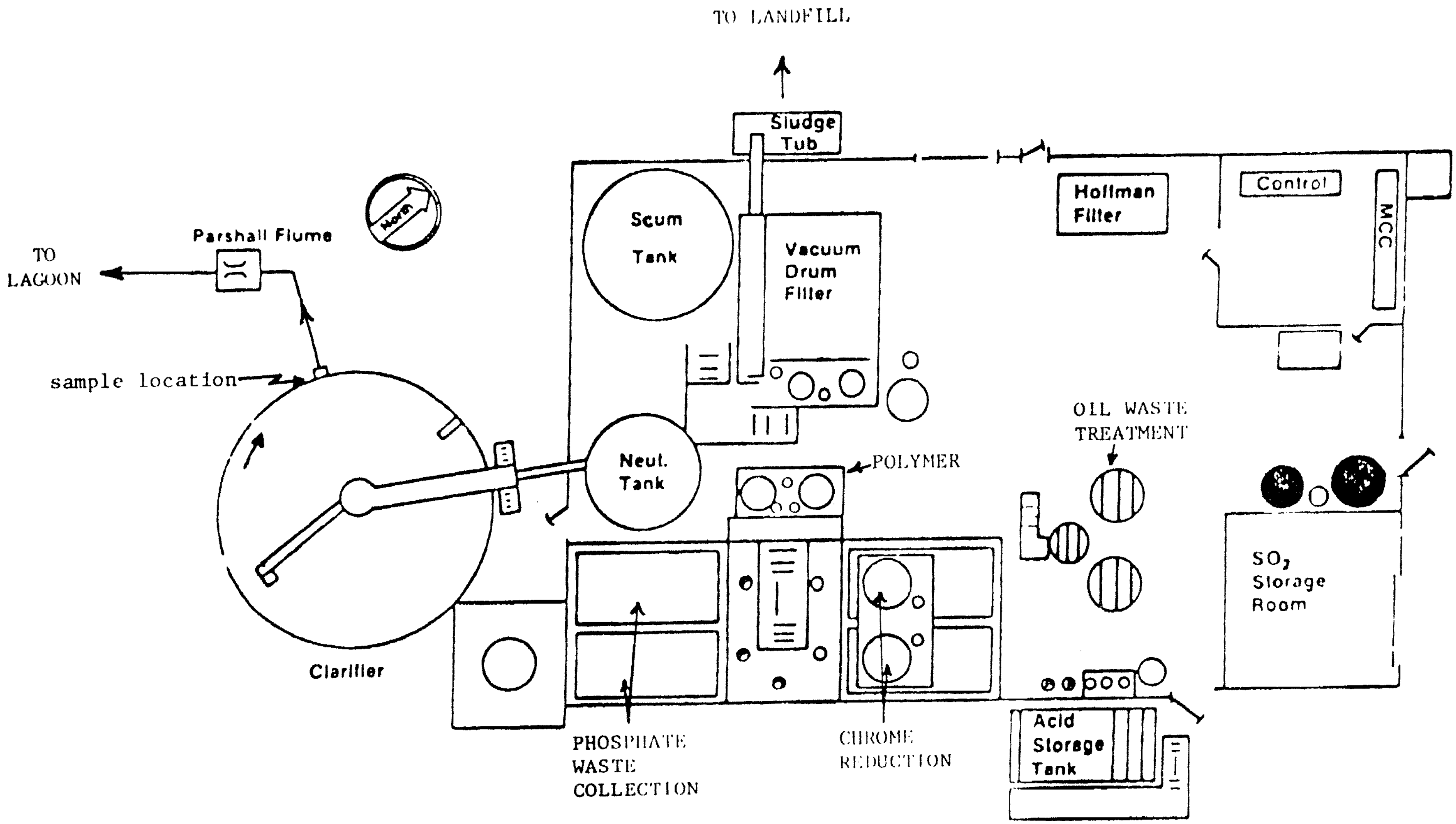



Figure 3. Industrial Wastewater Treatment Facility (IWT) Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

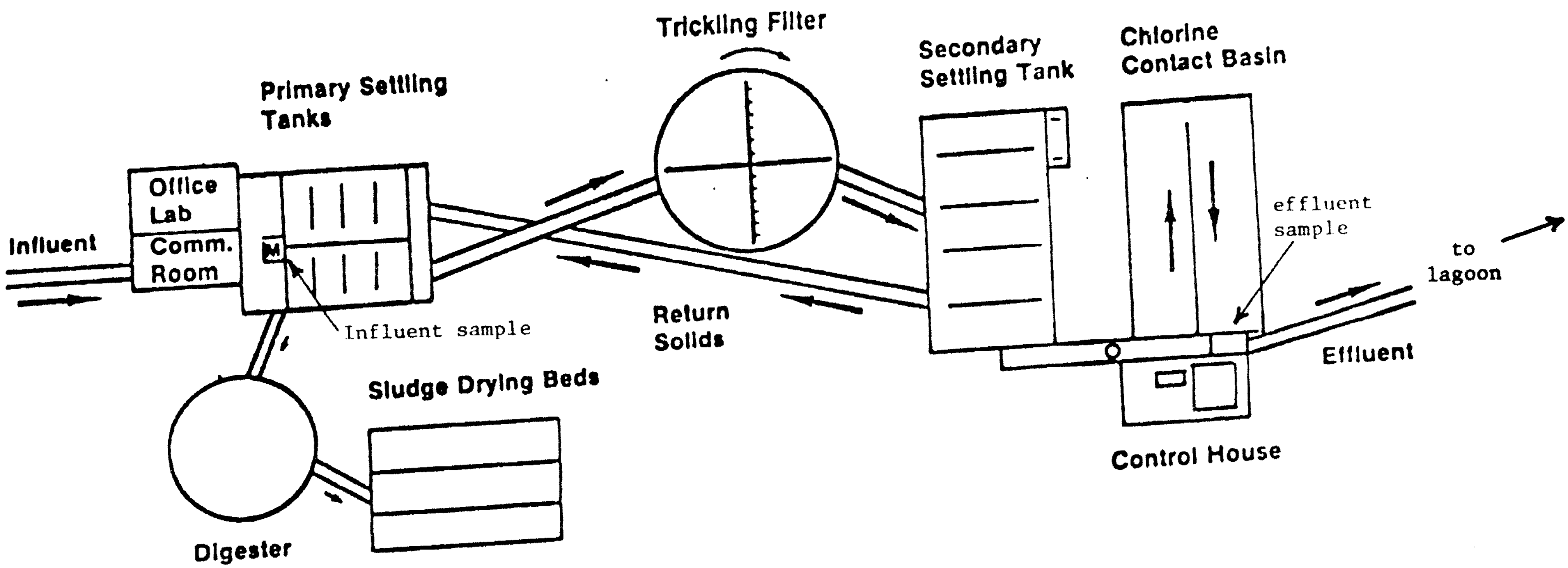



Figure 4. Domestic Wastewater Treatment Facility (DWT) Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

# PROCEDURES

Ecology and Kaiser collected 24 hour composite samples of IWT, DWT, cooling water discharges, effluent from the lagoon, and plant intake (Spokane River water). In addition, Ecology collected a composite sample of the DWT influent. Ecology composite samplers were fitted with teflon tubing and glass sampling bottles. They were set to collect approximately 330 mL of sample every 30 minutes. Sample containers were iced to keep them at 4°C.

All sampling equipment was cleaned before use by washing with non-phosphate detergent and rinsing successively with tap water, ten percent nitric acid, then three times with de-ionized water, pesticide grade methylene chloride, and pesticide grade acetone. Collection equipment was air-dried and then wrapped in aluminum foil until used.

A two gallon jar sent from the Manchester Laboratory filled with organic-free water was transported to the site for use as a field blank. One-third gallon was pumped from the two gallon jar through an Ecology compositor, swirled around in the glass sampling bottle and discarded. The next one and two-thirds of a gallon was also pumped through the compositor and poured from the bottle into sample containers to be analyzed for cyanide, phenols, and metals. This was considered an equipment blank.

Multiple grab samples of wastewater were also collected at the same locations at different times of the day. Grab samples were collected of IWT and DWT sludge. A detailed description of samples collected and parameters tested at each station is given in Table 1. Appendix A gives a description of sampling locations and identifies station ID codes.

Ecology and Kaiser composite samples taken at several of the stations were split for comparative analysis as shown in Table 1. Appendix B lists the various laboratories and methods used for the analyses.

Grab-composites were taken of the intake water, IWT effluent, and lagoon effluent for bioassay. These consisted of three grab samples collected during the course of the day and composited. *Daphnia magna*, fathead minnow, *Daphnia pulex*, and salmonid tests were used to determine the toxicity of these sampled streams.

Wastewater lagoon effluent particulate matter was collected using two Alfa Laval Bowl type continuous centrifuges (model WSB/MAB 103) following procedures described by Andreasson (1991). Effluent was pumped by a positive displacement pump through teflon tubing to the centrifuge trailer. The low TSS concentration in the effluent dictated a minimum practical flow

Table 1 – Sampling Times and Parameters Analyzed – Kaiser, Trentwood, 5/90.

| Station: | Inf–003 | Eff–003 | Kaiser–003 | Eff–003 | Eff–003 | Eff–002 | Kaiser–002 | Eff–002 | Eff–002 | Eff–001 | Eff–001 | Eff–002 | Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type: | composite | composite | composite | grab | grab | composite | composite | grab | grab | grab | grab | grab | Transfer |
| Date: | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 | 5/22/90 | 5/23/90 | 5/22–23/90 | 5/22–23/90 | 5/22/90 | 5/22/90 | 5/22/90 | 5/22/90 | 5/23/90 | 5/21/90 |
| Time: | 24 hrs | 24 hrs | 24 hrs | 11:15 | 12:25 | 24 hrs | 24 hrs | 9:00 | 14:15 | 15:15 | 15:15 | 8:40 | |
| Parameter Lab ID#: | 218155 | 218156 | 218178 | 218166 | 218167 | 218157 | 218179 | 218168 | 218169 | 218182 | 218183 | 218170 | 218165 |
| GENERAL CHEMISTRY | | | | | | | | | | | | | |
| Turbidity | E | E | E | | | E | | | | | | | |
| pH | E | E | E | | | E | | | | | | | |
| Conductivity | E | E | E | | | E | | | | | | | |
| Alkalinity | E | E | E | | | E | | | | | | | |
| Hardness | | E | | | | E | | | | | | | |
| Cyanide, total | | E | | | | EE+ | E/K | EE+/K | EE+/K | | | | E |
| SOLIDS | | | | | | | | | | | | | |
| TS | E | E | E | | | E | E | | | | | | |
| TNVS | E | E | E | | | E | E | | | | | | |
| TSS | E | E | E/K | E | E | E | E/K | E/K | E/K | | | E/K | |
| TNVSS | E | E | E | | | E | E | | | | | | |
| BOD5 | E | E | E/K | | | | | | | | | | |
| COD | E | E | E | E | E | E | E | E | E | | | E | |
| TOC | | | | | | | | | | | | | |
| NUTRIENTS | | | | | | | | | | | | | |
| NH3–N | E | E | E | E | E | E | E | E | E | | | E | |
| NO3+NO2–N | E | E | E | E | E | E | E | E | E | | | E | |
| Phosphate – Total | E | E | E | E | E | E | E/K | E/K | E/K | | | E/K | |
| Phosphate – Ortho | | | | E | | E | E/k | E/K | E/K | | | E/K | |
| % Solids | | | | | | | | | | | | | |
| Fecal Coliform | | | K | | E | | | | | | | | |
| ORGANICS AND METALS | | | | | | | | | | | | | |
| Phenols | | | | | | E | | E | E | E | | | E |
| Oil and Grease | | | | | | | K | E/K | E | E | E | E/K | |
| Aluminum | | EE** | | | | EE* | E** | | | | | | E** |
| PRIORITY POLLUTANTS | | | | | | | | | | | | | |
| BNAs | | | | | | E | | | | | | | |
| Pesticides/PCBs | | | | | | E | | | | | | | |
| VOAs | | | | | | E | | | | | | | |
| Metals | | EE** | | | | EE* | E**/K | | | | | | E** |
| Chrome (VI) | | | | | | EE* | E**/K | | | | | | |
| EP Tox | | | | | | | | | | | | | |
| BIOASSAYS | | | | | | | | | | | | | |
| Rainbow Trout | | | | | | E | | | | | | | |
| Microtox | | | | | | E | | | | | | | |
| Fathead Minnow | | | | | | E | | | | | | | |
| Daphnia pulex | | | | | | E | | | | | | | |
| Daphnia magna | | | | | | E | | | | | | | |
| FIELD OBSERVATIONS | | | | | | | | | | | | | |
| Temp | E | E | E | E | E | E | | E | E | | | E | |
| pH | E | E | E/K | E | E | E | | E | E | | | E | |
| Conductivity | E | E | E | E | E | E | | E | E | | | E | |
| Chlorine: | | | | | | | | | | | | | |
| Free Available | | | | E | E | | | | | | | | |
| Total Residual | | | | E | E | | | | | | | | |

E – Ecology analysis.
K – Kaiser analysis.

* (1) total recoverable and (1) dissolved metals.
** Total metals.

+(1) total and (1) weak and (1) dissociable cyanide.

Table 1 – Continued.

| Parameter | Station: / Type: / Date: / Time: / Lab ID#: | Eff–001 composite 5/22–23/90 24 hrs 218158 | Kaiser–001 composite 5/22–23/90 24 hrs 218180 | Eff–001 grab 5/22/90 10:35 218171 | Eff–001 grab 5/22/90 16:05 218172 | Eff–001 grab 5/23/90 10:58 218173 | Intake composite 5/22–23/90 24 hrs 218159 | Kaiser–Intake composite 5/22–23/90 24 hrs 218181 | Intake grab 5/22/90 11:35 218174 | North CW composite 5/22–23/90 24 hrs 218160 | South CW composite 5/22–23/90 24 hrs 218161 | North CW grab 5/22/90 10:49 218175 | South CW grab 5/22/90 16:26 218176 | Sig–003 grab 5/22/90 14:55 218162 | Sig–002 grab 5/22/90 15:05 218163 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GENERAL CHEMISTRY** | | | | | | | | | | | | | | | |
| Turbidity | | E | | | | | E | | | E | E | | | | |
| pH | | E | | | | | E | | | E | E | | | | |
| Conductivity | | E | | | | | E | | | E | E | | | | |
| Alkalinity | | E | | | | | E | | | E | E | | | | |
| Hardness | | E | | | | | E | | | E | E | | | | |
| Cyanide, total | | EE+ | E | EE+ | EE+ | | EE+ | E/K | | EE+ | EE+ | | | E | E |
| SOLIDS | | | | | | | | | | | | | | | |
| TS | | E | E | | | | E | E | | E | E | | | | |
| TNVS | | E | E | | | | E | E | | E | E | | | | |
| TSS | | E | E | E | E | E | E | E/K | | E | E | | | E | E |
| TNVSS | | E | E | | | | E | E | | E | E | | | | |
| BOD5 | | | | | | | | | | | | | | | |
| COD | | E | E | E | E | E | E | E | | E | E | | | | |
| TOC | | E | | | | | | | | | | | | | |
| NUTRIENTS | | | | | | | | | | | | | | | |
| NH3–N | | E | E | E | E | E | E | E | | | | | | | |
| NO3+NO2–N | | E | E | E | E | E | E | E | | | | | | | |
| Phosphate – Total | | E | E | E | E | E | E | E/K | | | | | | | |
| Phosphate – Ortho | | | E | E | E | E | E | E/K | | | | | | | |
| % Solids | | | | | | | | | | | | | | E | E |
| Fecal Coliform | | | | | | | | | | | | | | | |
| **ORGANICS AND METALS** | | | | | | | | | | | | | | | |
| Phenols | | E | | E | E | | E | | | E | E | | | | |
| Oil and Grease | | | | E | E | E | | K | E | K | K | E | E | | |
| Aluminum | | EE* | E** | | | | EE* | E**/K | | E**/K | E**/K | | | E** | E** |
| PRIORITY POLLUTANTS | | | | | | | | | | | | | | | |
| BNAs | | E | | | | | E | | | | | | | | |
| Pesticides/PCBs | | E | | | | | E | | | | | | | | |
| VOAs | | E | | | | | E | | | | | | | | |
| Metals | | EE* | E** | | | | EE* | E**/K^ | | E**/K^ | E**/K^ | | | E** | E** |
| Chrome (VI) | | EE* | | | | | EE* | K | | K | K | | | | |
| EP Tox | | | | | | | | | | | | | | | E |
| **BIOASSAYS** | | | | | | | | | | | | | | | |
| Rainbow Trout | | E | K | | | | E | K | | | | | | | |
| Microtox | | E | | | | | E | | | | | | | | |
| Fathead Minnow | | E | | | | | E | | | | | | | | |
| Daphnia pulex | | E | K | | | | E | K | | | | | | | |
| Daphnia magna | | E | | | | | E | | | | | | | | |
| **FIELD OBSERVATIONS** | | | | | | | | | | | | | | | |
| Temp | | E | E | E | E | | E | E | E | E | E | E | E | | |
| pH | | E | E | E | E | | E | E | E | E | E | E | E | | |
| Conductivity | | E | E | E | E | | E | E | E | E | E | E | E | | |
| Chlorine: | | | | | | | | | | | | | | | |
| Free Available | | | | | | | | | | | | | | | |
| Total Residual | | | | | | | | | | | | | | | |

E – Ecology analysis.
K – Kaiser analysis.
* (1) total recoverable and (1) dissolved metals.
** Total metals.
+(1) total and (1) weak and (1) dissociable cyanide.
^Zinc only.

rate to the centrifuges, which were operated for approximately 48 hours. The centrifuges were cleaned prior to sampling following procedures described by Seiders (1989).

All samples collected for analysis by Ecology were placed on ice and shipped to the Manchester Laboratory.

Physical dimensions of the two Flumes and weir were compared to standards (ISCO, 1985). Instantaneous flows were taken by measuring depth of flow through each of the devices and referring to tables for conversion to volume. These flows were compared simultaneously to readings from Kaiser flow measuring instrumentation.

## DATA QUALITY ASSURANCE

### Metals

Holding times were met. All values obtained from the method blank were within the targeted limits of ±20% except for lead (22%). The outlier for lead is not of significance (Appendix C).

Matrix spike values were within the targeted ±25% of true values in most of the analyses. The exceptions were Al(+39%) and Ag(-27%) in the water matrix and As(+29%) and Ti(+26%) in the sludge matrix. Those analyses which did not meet the targeted matrix values are flagged with the letter "N". Duplicate results were within the targeted range of ±20% (Appendix C).

### Volatiles, Semivolatiles, and Pesticides/PCBs

All samples were extracted and analyzed within the USEPA recommended holding times, which for volatiles, semivolatiles, and pesticides/PCBs is seven days. The extraction, cleanup, and analyses followed the procedure outlined in method SW846 (Appendix B). Method blank, matrix spike, and matrix spike duplicate results for all three analytical parameters are given in Appendix C.

Surrogate recoveries for the samples, the matrix spikes, and method blanks were within QC recovery limits.

Matrix spike and matrix spike duplicate (MS/MSD) recoveries and the relative percent difference (RPD) are within acceptable range for volatile and pesticide/PCB samples. The MS/MSD recoveries for the semivolatile samples were below the Contract Lab Program (CLP) recovery limits for five of 22 compounds, indicating the unacceptability of these recoveries. Sample results are not qualified based on MS/MSD results as recommended by Kirchmer (1988). The RPD for each of the spike analytes was within QC limits. All data is acceptable for use.

**Nutrients**

All analyses were done within holding times, except for $NO_2+NO_3$-N, which was six days over the required two days. The sample was preserved, and the deterioration may have been minimal, but results are qualified. Spike recoveries were within the accepted range. All duplicate analyses were acceptable as well (the difference should be less than 0.01 or $\pm 5\%$), except for $NO_2+NO_3$-N which was 0.12. Check standards and blank analyses were also within accepted ranges.

**Bioassays**

Salmonid, Microtox®, fathead minnow, *Daphnia pulex*, and *Daphnia magna* bioassays were done on lagoon effluent, IWT discharge, and the plant intake water. The salmonid laboratory control showed no mortality. The mean weight of the fish used was 0.61 g and mean length was 47.5 mm. The QA/QC documentation and water quality data were appropriate for the test (Stinson, 1990).

Synthetic water with hardness of 90 mg/L and alkalinity 60-70 mg/L was used for dilution during the fathead minnow bioassay. The dissolved oxygen saturation was kept at 40% or better at all times. For all three samples, the survival of control larvae was greater than 94% and the mean weight was greater than 0.55 mg. Therefore, the QA/QC procedure followed was adequate for the test and is acceptable (Stinson, 1990a).

Samples were used at 100% concentration for the *Daphnia pulex* bioassay. Reconstituted water with hardness of (80-90 mg/L as $CaCO_3$) was used as a control. Survival in the control was 90%, well above what is required to accept the data (Stinson, 1990b).

A series of five concentrations with 10 replicates per concentration with one *Daphnia* per replicate constituted the test mechanism for the *Daphnia magna* bioassay. A control was also set up. A separate vial for each concentration was set up to measure water quality. The quality control and test solution chemistry data were appropriate for the test and the control had a 100% survival rate. Therefore, the test is acceptable (Stinson, 1990c).

Phenol was used as the reference toxicant and saline-adjusted sterile deionized water was analyzed as the negative control for the Microtox® bioassay. QA/QC documentation and results were acceptable for the test (Stinson, 1990d).

**Other Parameters**

Manchester Laboratory analyzed samples for turbidity, pH, conductivity, hardness, total cyanide, cyanide (weak acid), solids, $BOD_5$, COD, TOC, and fecal coliform. The standard QA/QC procedures of the laboratory were followed, and no unusual problems were encountered. The data are acceptable for use.

## RESULTS AND DISCUSSION

### Flow

Kaiser maintains instrumentation to monitor flow from the IWT and DWT facilities and the lagoon. Flows obtained from Kaiser, during the inspection, are listed in Table 2.

Table 2: Flows Recorded by Kaiser Instrumentation - Kaiser, Trentwood 5/90.

| Date 7 am to 7 am | Lagoon discharge (MGD) | IWT discharge (MGD) | DWT discharge (MGD) |
|---|---|---|---|
| 5/20-21/90 | 22.0 | 0.106 | 0.198 |
| 5/21-22/90 | 22.5 | 0.154 | 0.172 |
| 5/22-23/90 | 22.1 | 0.117 | 0.172 |

Three instantaneous flow measurements were taken on two different days at the lagoon effluent weir. The measured flows, 15.06 to 15.54MGD, were well below Kaiser's recorded flows of 22.0 to 22.5 MGD. The shape of the rectangular weir was altered by slime growths which undoubtedly contributed to the discrepancy in flow readings.

Similar discrepancies were found when measuring the IWT and DWT flows to the lagoon. All appeared to be due to inconsistent maintenance of the devices resulting in biological growths.

### NPDES Permit Compliance

Kaiser's wastewater treatment systems were operating well within the permit and interim effluent limits except for oil and grease from the lagoon effluent (001) (Table 3). The effluent concentration of oil and grease ranged from 1.7 mg/L to 17.6 mg/L. The highest of the five concentrations measured exceeded both the daily average and the daily maximum interim effluent limits. Results of general chemistry analyses are presented in Table 4.

### Domestic Wastewater Discharge (003) to Wastewater Lagoon

The DWT facility was working properly during the inspection, with a moderate percent removal of TSS, COD, and $BOD_5$ (Table 5). The temperature of Kaiser's composite sample was 8.7°C; this should be 4°C.

Table 3 - Comparison of Inspection Results to NPDES Permit Limits - Kaiser, Trentwood, 5/90.

WASTEWATER LAGOON DISCHARGE (001)

**** Flow = 22.2 MGD

| Parameter | Interim Effluent Limits Daily Maximum (mg/l) | Interim Effluent Limits Daily Average (mg/l) | Inspection Data Ecology Composite (mg/l) | Inspection Data Grab Samples (mg/l) |
|---|---|---|---|---|
| Oil and Grease | 15 | 10 | | 1.7;4.7;9.6 1.8; 17.6 |
| TSS | 15 | 10 | 3 | 3;2;3 |
| Zinc (total) | | 0.5 | 0.09 | |
| Chromium (total) | | 0.05 | 0.01 | |
| pH, s.u. | 6 - 9 | 6 - 9 | 7.8 | 7.2;7.6;8.0 |
| Temperature | * | * | | 18.6, 20.1 |
| Cyanide (lbs./day)** | 1.42 | 0.59 | 0.37 U | 0.37 U |
| Al - Total (mg/l) | ----- | 0.5 | 0.35 N | |

* Should not violate water quality criteria (WAC 173-201) ** Permit limits; not interim limits

IWT DISCHARGE (002)

**** Flow = 0.126 MGD

| Parameter | NPDES Permit Limits Daily Maximum (lbs/day) | NPDES Permit Limits Monthly Average (lbs/day) | Inspection Data Ecology Composite (mg/l) | Inspection Data Grab Samples (mg/l) | Inspection Data Effluent Loading (lbs/day) |
|---|---|---|---|---|---|
| Oil and Grease | 84 | 50 | na | 24.5;44.8 | 25.8; 47.1 |
| TSS | 171 | 82 | 32 | 34; 53 | (34); 36; 56 |
| Ortho-phosphate - (as P) (filtered) | 12.0 | 9.6 | 0.005 U | 0.005 U | ns |
| Aluminum (total) | *** | *** | 80.5 N | | 84.65 |
| Zinc (total) | 3.08 | 1.30 | 0.05 | | 0.05 |
| Chrome (VI) | 0.20 | 0.16 | 0.05 | | 0.05 |
| Chromium (total) | 0.94 | 0.39 | 0.01 U | | ns |
| Cyanide | 0.63 | 0.26 | 0.002 U | 0.002 | 0.002 |

*** = Effluent limit for Al is suspended during the schedule of compliance (refer to order no. DE 88-E248).

DWT DISCHARGE (003)

**** Flow = 0.181 MGD

| Parameter | NPDES Permit Limits Weekly Average | NPDES Permit Limits Monthly Average | Inspection Data Ecology Composite | Inspection Data Grab Samples | Inspection Data Effluent Loading |
|---|---|---|---|---|---|
| BOD5 | | | | | |
| (mg/L) | 45 | 30 | 8 | na | na |
| (lbs/day) | 94 | 63 | | - | 12 |
| TSS | | | | | |
| (mg/L) | 45 | 30 | 8 | 7 | na |
| (lbs/day) | 94 | 63 | | | 12 |
| Fecal Coliform | | | | | |
| (#/100 ml) | 400 | 200 | na | 3 | |

**** = Average daily flow from 5/20/90 to 5/23/90
N - Spiked sample recovery not within control limits
U - Indicates compound was not detected at the given detection limit.
na = Not applicable
ns = Non-significant

Table 4 – General Chemistry Results – Kaiser, Trentwood, 5/90.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Station: | Inf–003 | Eff–003 | Kaiser–003 | Eff–003 | Eff–003 | Eff–002 | Kaiser–002 | Eff–002 | Eff–002 | Eff–001 | Eff–001 | Eff–002 |
| | Type: | composite | composite | composite | grab | grab | composite | composite | grab | grab | grab | grab | grab |
| | Date: | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 | 5/22/90 | 5/23/90 | 5/22–23/90 | 5/22–23/90 | 5/22/90 | 5/22/90 | 5/22/90 | 5/22/90 | 5/23/90 |
| | Time: | 24 hrs | 24 hrs | 24 hrs | 11:15 | 12:25 | 24 hrs | 24 hrs | 9:00 | 14:15 | 15:15 | 15:15 | 8:40 |
| Parameter | Lab ID#: | 218155 | 218156 | 218178 | 218166 | 218167 | 218157 | 218179 | 218168 | 218169 | 218182 | 218183 | 218170 |
| **LABORATORY** | **UNITS** | | | | | | | | | | | | |
| Turbidity | NTU | 7.9 | 4.8 | 3.7 | | | 8.7 | | | | | | |
| pH | S.U. | 7.5 | 7.3 | 7.5 | | | 8.8 | | | | | | |
| Conductivity | umho/cm | 475 | 467 | 465 | | | 2450 | | | | | | |
| Alkalinity | mg/l as CaCO3 | 136(132)+ | 142 | 110 | | | 144 | | | | | | |
| Hardness | mg/l as CaCO3 | | 157 | | | | 1470 | | | | | | |
| Cyanide, Total | mg/l | | 0.002 | | | | 0.002 U | 0.002 | 0.002 U | 0.002 | | | |
| Cyanide, WAD | mg/l | | | | | | 0.002 U | | 0.002 | 0.002 | | | |
| SOLIDS | | | | | | | | | | | | | |
| TS | mg/l | 326 | 302 | 307 | | | 2630 | 2630 | | | | | |
| TNVS | mg/l | 194 | 195 | 178 | | | 2130 | 2110 | | | | | |
| TSS | mg/l | 39 | 8 | 8 | 7 | 7 | 32 | 61 | 53 | 34 | | | 17 |
| TNVSS | mg/l | 7 | 1 | 2 | | | 20 | 32 | | | | | |
| BOD5 | mg/l | 47 | 8 | 6 | | | | | | | | | |
| COD | mg/l | 108 | 41.7 | 41.6 | 34.2 | 40.5 | 617 | 572 | 667 | 550 | | | 522 |
| TOC | mg/l | | | | | | | | | | | | |
| NUTRIENTS | | | | | | | | | | | | | |
| NH3–N | mg/l as N | 3.43 | 3.48 | 3.36 | 2.41 | 3.31 | 2.02 | 2.32 | 2.00 | 1.86 | | | 1.83 |
| NO3+NO2–N | mg/l as N | 3.48 JH | 4.48 JH | 4.47 JH | 4.74 JH | 4.53 JH | 0.443 JH | 0.262 JH | 0.498 JH | 0.498 JH | | | 0.065 JH (0.053 JH)+ |
| Phosphate – Total | mg/l as P | 1.28 | 1.74 | 1.38 | 1.34 | 2.16 | 1.04 | 1.0 | 1.20 | 1.36(1.34)+ | | | 0.460 |
| Phosphate – Ortho | mg/l as P | | | | 0.855 | | 0.005 U | 0.005 U | 0.005 U | 0.005 U | | | 0.005 U |
| Fecal Coliform | #/100 ml | | | | | 3 | | | | | | | |
| Phenols | mg/l | | | | | | 10.6 | | 0.919 | 0.941 | 0.005 U | | |
| Oil and Grease | mg/l | | | | | | | | 44.8 | 24.5 | 4.7 | 1.7 | 17.3 |
| **FIELD OBSERVATIONS** | | | | | | | | | | | | | |
| Temp | deg. C | | | | 14.6 | 15.6 | | | 33.6 | 35.3 | | | 31.1 |
| pH | S.U. | 7.9 | 7.7 | 8.0 | 7.6 | 7.8 | 8.7 | | 8.6 | 8.5 | | | 8.6 |
| Conductivity | umho/cm | 470 | 430 | 467 | 434 | 462 | 2100 | | 2120 | 2350 | | | 2200 |
| Chlorine: | | | | | | | | | | | | | |
| Free Available | mg/l | | | | 0.5 | <0.1 | | | | | | | |
| Total Residual | mg/l | | | | 1.5 | 1.3 | | | | | | | |

+Duplicate analysis

* (membrane filter technique)

U – Not detected at the given quantification limit.

WAD – Weak and Dissociable.

JH – Value is an approximation. Samples were held longer than the EPA holding time limits.

Table 4 - Continued.

| Parameter | Station: / Type: / Date: / Time: / Lab ID#: | Eff-001 composite 5/22-23/90 24 hrs 218158 | Kaiser-001 composite 5/22-23/90 24 hrs 218180 | Eff-001 grab 5/22/90 10:35 218171 | Eff-001 grab 5/22/90 16:05 218172 | Eff-001 grab 5/23/90 10:58 218173 | Intake composite 5/22-23/90 24 hrs 218159 | Kaiser-Intake composite 5/22-23/90 24 hrs 218181 | Intake grab 5/22/90 11:35 218174 | North CW composite 5/22-23/90 24 hrs 218160 | South CW composite 5/22-23/90 24 hrs 218161 | North CW grab 5/22/90 10:49 218175 | South CW grab 5/22/90 16:26 218176 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LABORATORY** | **UNITS** | | | | | | | | | | | | |
| Turbidity | NTU | 1.8 | | | | | 1.7 | | | 1.5 | 3.4 | | |
| pH | S.U. | 7.2 | | | | | 7.1 | | | 7.1 | 7.2 | | |
| Conductivity | umho/cm | 83 | | | | | 59 | | | 64 | 59 | | |
| Alkalinity | mg/l as CaCO3 | 36 | | | | | 26 | | | 25 | 29 | | |
| Hardness | mg/l as CaCO3 | 36.8 | | | | | 26.2 | | | 26.6 | 24.5 | | |
| Cyanide, Total | mg/l | 0.002 U | 0.002 U | 0.002 U | 0.002 U | | 0.002 U | 0.002 U | | 0.002 U | 0.002 U | | |
| Cyanide, WAD | mg/l | 0.002 U | | 0.002 U | 0.002 U | | 0.002 U | | | 0.002 U | 0.002 U | | |
| SOLIDS | | | | | | | | | | | | | |
| TS | mg/l | 87 | 110 | | | | 59 | 117 | | 58 | 129 | | |
| TNVS | mg/l | 51 | 48 | | | | 30 | 57 | | 26 | 27 | | |
| TSS | mg/l | 3 (1 U)* | 3 | 3 | 2 | 3 | 1 | 13 | | 2 | 9 | | |
| TNVSS | mg/l | 2 | 1 | | | | 1 U | 9 | | 1 | 7 | | |
| BOD5 | mg/l | | | | | | | | | | | | |
| COD | mg/l | 10.5 | 9.9 | 9.7 | 11.4 | 13.8 | 9.5 | 5.2 | | 6.0 | 6.7 | | |
| TOC | mg/l | 6.02 | | | | | | | | | | | |
| NUTRIENTS | | | | | | | | | | | | | |
| NH3-N | mg/l as N | 0.060 | 0.043 | .022(0.021) | 0.040 | 0.028 | 0.005 U | 0.005 U | | | | | |
| NO3+NO2-N | mg/l as N | 0.076 JH | 0.091 JH | 0.077 JH | 0.090 JH | 0.081 JH | 0.048 JH | 0.035 JH (0.038 JH)+ | | | | | |
| Phosphate - Total | mg/l as P | 1.12 | 0.034 | 0.028 | 0.039 | 0.045 | 0.015 | 0.017(0.018)+ | | | | | |
| Phosphate - Ortho | mg/l as P | | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.036 | 0.005 U | | | | | |
| Fecal Coliform | #/100 ml | | | | | | | | | | | | |
| Phenols | mg/l | 0.005 U | | 0.005 U | 0.005 U | | 0.005 U | | | 0.005 U | 0.005 U | | |
| Oil and Grease | mg/l | | | 1.8 | 17.6 | 9.6 | | | 6.4 | | | 1.0 U | 1.1 |
| **FIELD OBSERVATIONS** | | | | | | | | | | | | | |
| Temp | deg. C | | | 18.6 | 20.1 | | | | 12.9 | | 10.9 | 18.8 | 14.6 |
| pH | S.U. | 7.8 | 7.6 | 8.0 | 7.2 | | 7.6 | 7.4 | 7.8 | 7.6 | 7.4 | 7.6 | 7.3 |
| Conductivity | umho/cm | 86 | 86 | 92 | 90 | | 55 | 55 | 57 | 69 | 68 | 625 | 61 |
| Chlorine: | | | | | | | | | | | | | |
| Free Available | mg/l | | | | | | | | | | | | |
| Total Residual | mg/l | | | | | | | | | | | | |

+Duplicate analysis

* (membrane filter technique)

U - Not detected at the given quantification limit.

WAD - Weak and Dissociable.

JH - Value is an approximation. Samples were held longer than the EPA holding time limits.

Table 5: Removal Efficiencies of DWT Facility - Kaiser, Trentwood 5/90.

Flow = 0.181 MGD

| Parameter | Influent Loading (lbs./day) | Effluent Loading (lbs./day) | Removal Efficiency (percent) |
|---|---|---|---|
| TSS | 59 | 12 | 80 |
| $BOD_5$ | 71 | 12 | 83 |
| COD | 163 | 63 | 61 |

Chromium, lead, selenium and zinc were the only metals positively identified in the DWT effluent (Table 6). Lead concentration slightly exceeded the chronic water quality criterion. Neither a characterization for organics nor an assessment for toxicity using bioassays was done on the DWT effluent.

**Industrial Wastewater Discharge (002) to Wastewater Lagoon**

The IWT effluent contained high levels of solids which were predominantly non-volatile (Table 4). Chromium (6+) and copper exceeded both acute and chronic fresh water criteria while selenium exceeded the chronic fresh water criterion (Table 6). Although other metals were identified (Sb, Be, Lb, Ni, and Zn), they were at relatively low concentrations.

Results of the organic priority pollutant scan shows that 4-methylphenol, benzoic acid, naphthalene and several Pesticide/PCB compounds were positively identified. Table 7 is a list of organic compounds identified with corresponding acute and chronic water quality criteria. This information is included because the permit does specify effluent limits for Outfall 002. Appendix D provides a complete organic priority pollutant scan with detection limits.

Results of various *Daphnia magna*, fathead minnow, salmonid, and *Daphnia pulex* bioassays are given in Figures 5-8, respectively. These figures show that IWT effluent caused 100% mortality in all four bioassays indicating high levels of toxicity. The reporting laboratory noted that ammonia, hardness, and conductivity were all elevated in the salmonid test solution (Stinson, 1990). However, the ammonia result (13.9 mg/L) is not consistent with the result shown in Table 4 (2.02 mg/L) and, therefore, is suspect. [Note: Kaiser has installed a polishing filtration system for the effluent from IWT since the inspection was completed. It is designed to significantly reduce contaminant concentrations (Blau, 1990).]

Results of the Microtox® analyses shown in Table 8 support the other bioassay results.

Table 6 – Priority Pollutant Metals Results – Kaiser, Trentwood, 5/90.

| | Station: | Eff–003 | Eff–002 | Eff–002 | Kaiser–002 | Eff–001 | Eff–001 | Kaiser–001 |
|---|---|---|---|---|---|---|---|---|
| | Type: | composite | composite | composite | composite | composite | composite | composite |
| | Date: | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 |
| | Time: | 24 hrs | 24 hrs | 24 hrs | 24 hrs | 24 hrs | 24 hrs | 24 hrs |
| | Lab ID#: | 218156 | 218157 | 218157 | 218179 | 218158 | 218158 | 218180 |
| | Matrix: | Water | Water | Water | Water | Water | Water | Water |
| | Anal for: | Tot. Met | Tot. Met | Tot. Rec. | Tot. Met | Tot. Met | Tot. Rec. | Tot. Met |
| PARAMETER | UNITS | | | | | | | |
| Aluminum | ppm | 0.46 N | 80.5 N | 80.3 N | 8.11 N | 0.35 N | 0.47 N | 0.41 N |
| Antimony | ppm | 0.06 U | 0.31 | 0.3 | 0.57 | 0.13 | 0.06 U | 0.42 |
| Arsenic | ppm | 0.052 N | 0.136 N | 0.063 N | 0.005 UN | 0.065 N | 0.005 UN | 0.005 UN |
| Beryllium | ppm | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Cadmium | ppm | 0.005 U | 0.007 | 0.008 | 0.01 | 0.005 U | 0.005 U | 0.005 U |
| Chromium | ppm | 0.02 | 0.01 U | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| Copper | ppm | 0.025 U | 0.033 | 0.032 | 0.037 | 0.025 U | 0.025 U | 0.025 U |
| Lead | ppm | 0.018 | 0.005 | 0.005 U | 0.005 U | 0.012 | 0.042 | 0.006 |
| Nickel | ppm | 0.04 U | 0.065 | 0.05 | 0.06 | 0.04 U | 0.04 U | 0.04 U |
| Selenium | ppm | 0.054 | 0.206 | 0.154 | 0.225 | 0.033 | 0.009 | 0.012 |
| Silver | ppm | 0.01 UN | 0.01 UN | 0.01 UN | 0.01 N | 0.01 UN | 0.01 UN | 0.01 UN |
| Thallium | ppm | 0.01 UN | 0.1 UN | 0.1 UN | 0.1 UN | 0.1 UN | 0.1 UN | 0.1 UN |
| Zinc | ppm | 0.11 | 0.05 | 0.05 | 0.06 | 0.09 | 0.09 | 0.13 |
| Mercury | ppm | 0.002 U | 0.0002 U | 0.0002 U | 0.0002 U | 0.0002 U | 0.002 U | 0.0002 U |
| Chromium(6+) | ppm | – | 0.047 | – | 0.032 | 0.023 | – | – |

U = Not detected at the given quantification limit.
N = Spiked sample recovery not within control limits.

Table 6. Priority Pollutant Metals Results (Continued).

| | Station: | Intake | | Intake | | Kaiser-Intake | | North CW | | South CW | | SLG-003 | SLG-002 | Blank | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type: | composite | | composite | | composite | | composite | | composite | | Grab | Grab | Grab | |
| | Date: | 5/22-23/90 | | 5/22-23/90 | | 5/22-23/90 | | 5/22-23/90 | | 5/22-23/90 | | 5/22/90 | 5/22/90 | 5/21/90 | |
| | Time: | 24 hrs | | 24 hrs | | 24 hrs | | 24 hrs | | 24 hrs | | | | | |
| | Lab ID#: | 218159 | | 218159 | | 218181 | | 218160 | | 218161 | | 218162 | 218163 | 218165 | |
| | Matrix: | Water | | Water | | Water | | Water | | Water | | Sludge | Sludge | Water | |
| | Anal for: | Tot. Met | | Tot. Rec. | | Tot. Met | | Tot. Met | | Tot. Met | | Tot. Met | Tot. Met | Tot. Met | |
| PARAMETER | UNITS | | | | | | | | | | | | | | |
| Aluminum | ppm | 0.24 | N | 0.22 | N | 0.31 | N | 0.29 | N | 0.6 | N | 15949 | 74591 | 0.86 | N |
| Antimony | ppm | 0.11 | U | 0.21 | | 0.45 | | 0.18 | | 0.34 | | 144 | 118 | 0.34 | |
| Arsenic | ppm | 0.013 | N | 0.007 | N | 0.005 | U | 0.005 | U | 0.023 | N | 41.4 | 11 | 0.005 | UN |
| Beryllium | ppm | 0.005 | U | 0.005 | U | 0.005 | U | 0.005 | U | 0.005 | U | 1.9 | 1.05 | 0.005 | U |
| Cadmium | ppm | 0.005 | U | 0.005 | U | 0.005 | U | 0.005 | U | 0.005 | U | 21.6 | 6.2 | 0.005 | U |
| Chromium | ppm | 0.01 | U | 0.01 | U | 0.01 | U | 0.01 | U | 0.01 | | 316 | 99 | 0.01 | U |
| Copper | ppm | 0.025 | U | 0.025 | U | 0.025 | U | 0.025 | U | 0.025 | | 1101 | 279 | 0.025 | U |
| Lead | ppm | 0.005 | U | 0.005 | U | 0.021 | | 0.006 | | 0.026 | | 38.7 | 118 | 0.008 | |
| Nickel | ppm | 0.04 | U | 0.04 | U | 0.04 | U | 0.04 | U | 0.04 | U | 41.4 | 71.5 | 0.04 | U |
| Selenium | ppm | 0.006 | | 0.007 | | 0.005 | U | 0.009 | | 0.009 | | 29.2 | 34.8 | 0.005 | U |
| Silver | ppm | 0.01 | U | 0.01 | U | 0.01 | U | 0.01 | U | 0.01 | U | 34.1 | 1 | 0.01 | UN |
| Thallium | ppm | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 38.1 | 8.7 | 0.1 | UN |
| Zinc | ppm | 0.08 | | 0.08 | | 0.11 | | 0.09 | | 0.12 | | 4633 | 1279 | 0.08 | |
| Mercury | ppm | 0.0002 | U | 0.0002 | U | 0.0002 | U | 0.0002 | U | 0.0002 | U | 11.4 | 0.1 | 0.0002 | U |
| Chromium(6+) | ppm | 0.023 | | - | | - | | - | | - | | - | - | - | |

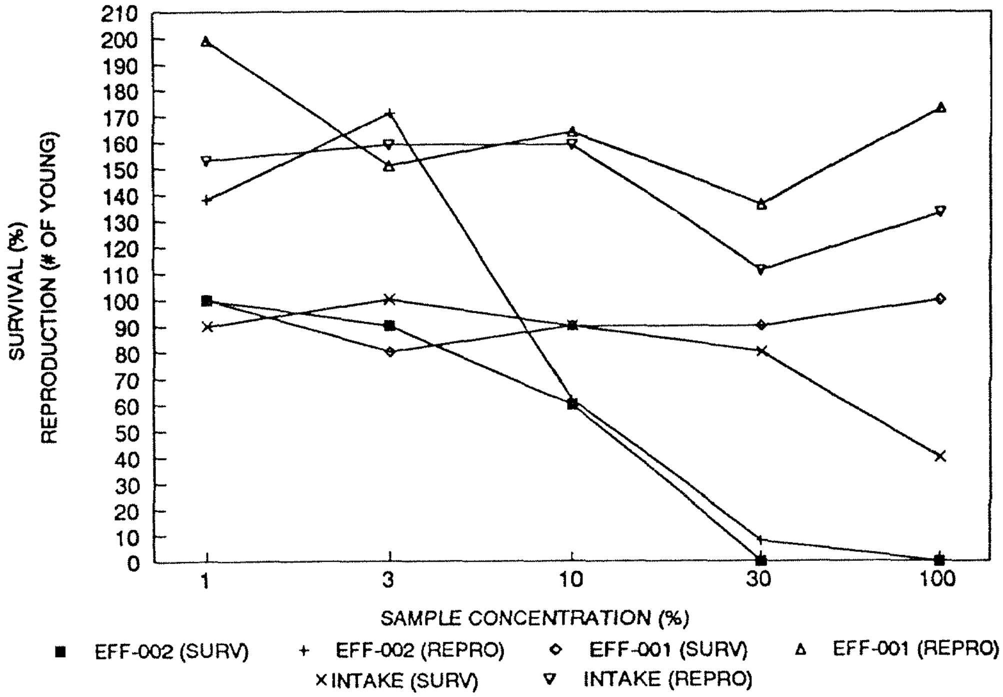
U = Not detected at the given quantification limit.
N = Spiked sample recovery not within control limits.

Table 7 - Organic Priority Pollutant Scan Results - Kaiser, Trentwood, 5/90.

| | Station: | Eff-002 | | Eff-001 | | Intake | | Water Quality Criteria Freshwater | |
|---|---|---|---|---|---|---|---|---|---|
| | Type: | *composite* | | *composite* | | *composite* | | | |
| | Date: | 5/22-23/90 | | 5/22-23/90 | | 5/22-23/90 | | acute | chronic |
| | Time: | 24 hrs | | 24 hrs | | 24 hrs | | | |
| Parameter | Lab Sample #: | 218157 | | 218158 | | 215159 | | | |
| VOA Compounds (ug/l) | | | | | | | | | |
| Acetone | | 220 | E | 2 | J | 10 | U | | |
| Xylene (total) | | 3 | J | 5 | U | 5 | U | | |
| BNA Compounds (ug/l) | | | | | | | | | |
| Phenol | | 1000 | E | 10 | U | 10 | U | 10200+ | 2560+ |
| 4-Methylphenol | | 15 | | 10 | U | 10 | U | | |
| Benzoic Acid | | 240 | | 50 | U | 50 | U | | |
| Naphthalene | | 13 | | 10 | U | 10 | U | 2300+ | 620+ |
| Pesticide/PCB Compounds (ug/l) | | | | | | | | | |
| beta-BHC | | 1.6 | | 0.050 | U | 0.050 | U | | |
| gamma-BHC (Lindane) | | $\boxed{0.11}$ | | 0.050 | U | 0.050 | U | 2.0 | 0.08 |
| Heptachlor | | $\boxed{0.11}$ | | 0.050 | U | 0.0072 | J | 0.52 | 0.0038 |
| Aldrin | | 0.050 | U | 0.050 | U | 0.020 | J | 3 | |
| Dieldrin | | $\boxed{0.13}$ | | 0.10 | U | 0.10 | U | 2.5 | 0.0019 |
| Endosulfan Sulfate | | $\boxed{0.15}$ | | 0.10 | U | 0.10 | U | 0.22 | 0.056 |

U - Indicates the compound was not detected at the given quantification limit.
J - Indicates an estimated value, concentration is below method quantification limit.
E - Indicates the concentration of the associated value exceeds the known calibration range.
+ - Insufficient data to develop criteria. Presented value is Lowest Observed Effect Concentration (LOEC).

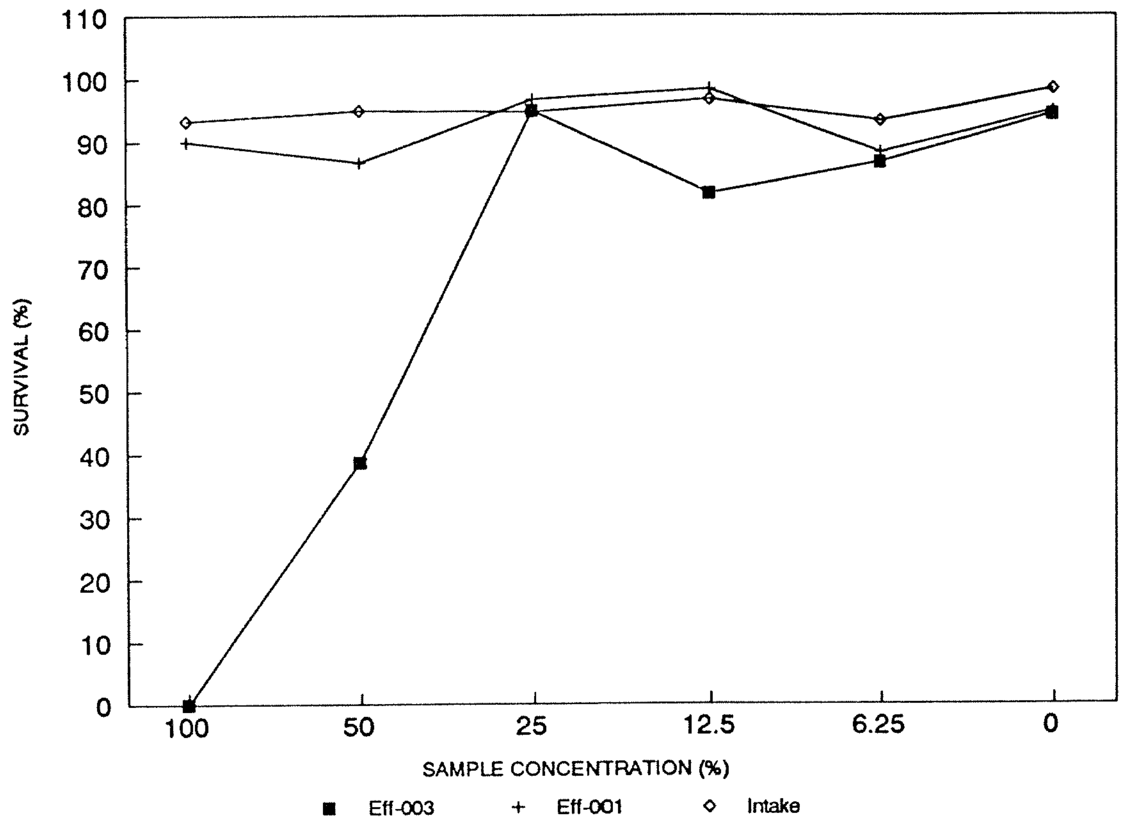
# FIGURE 5. RESULTS OF DAPHNIA MAGNA BIOASSAY




| LAB ID | Sample Conc. (%) | Survival (%) | Reproduction (# of young) |
|---|---|---|---|
| 218157 | 1 | 100 | 138 |
| (Eff-002) | 3 | 90 | 171 |
| | 10 | 60 | 62 |
| | 30 | 0 | 8 |
| | 100 | 0 | 0 |
| 218158 | 1 | 100 | 199 |
| (Eff-001) | 3 | 80 | 151 |
| | 10 | 90 | 164 |
| | 30 | 90 | 136 |
| | 100 | 100 | 173 |
| 218159 | 1 | 90 | 153 |
| (Intake) | 3 | 100 | 159 |
| | 10 | 90 | 159 |
| | 30 | 80 | 111 |
| | 100 | 40 | 133 |

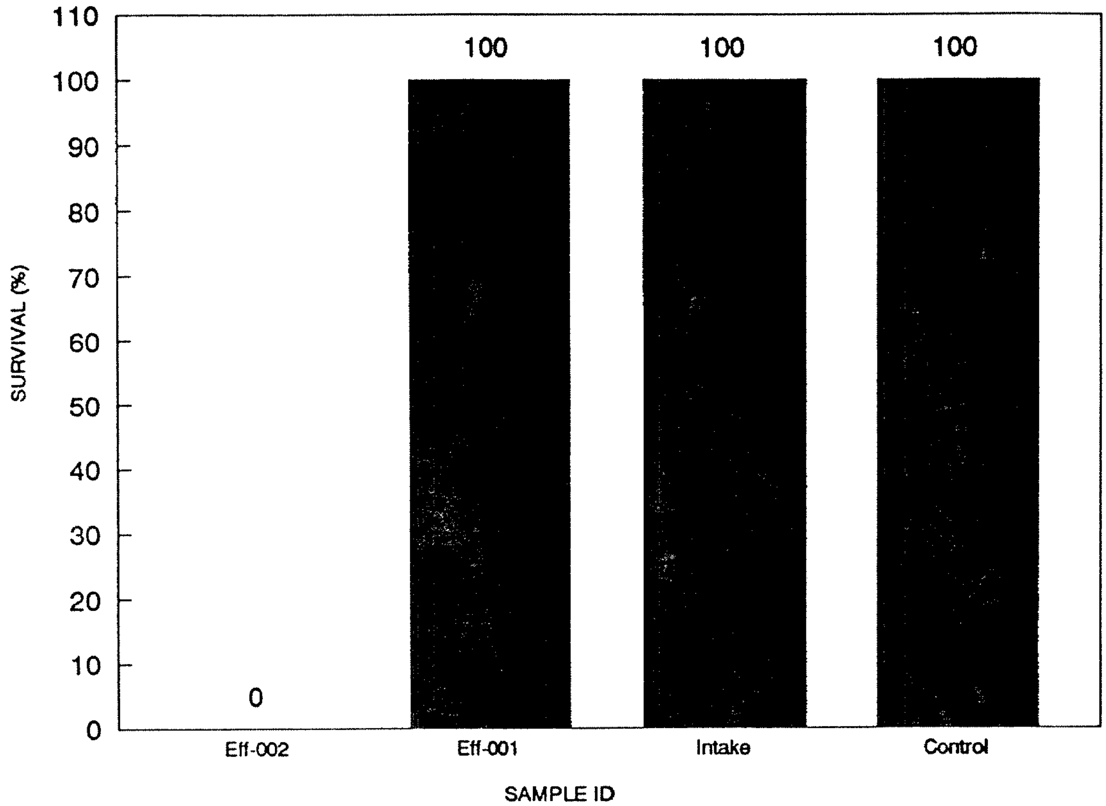
# FIGURE 6. RESULTS OF FATHEAD MINNOW BIOASSAY

(Growth & Survival)



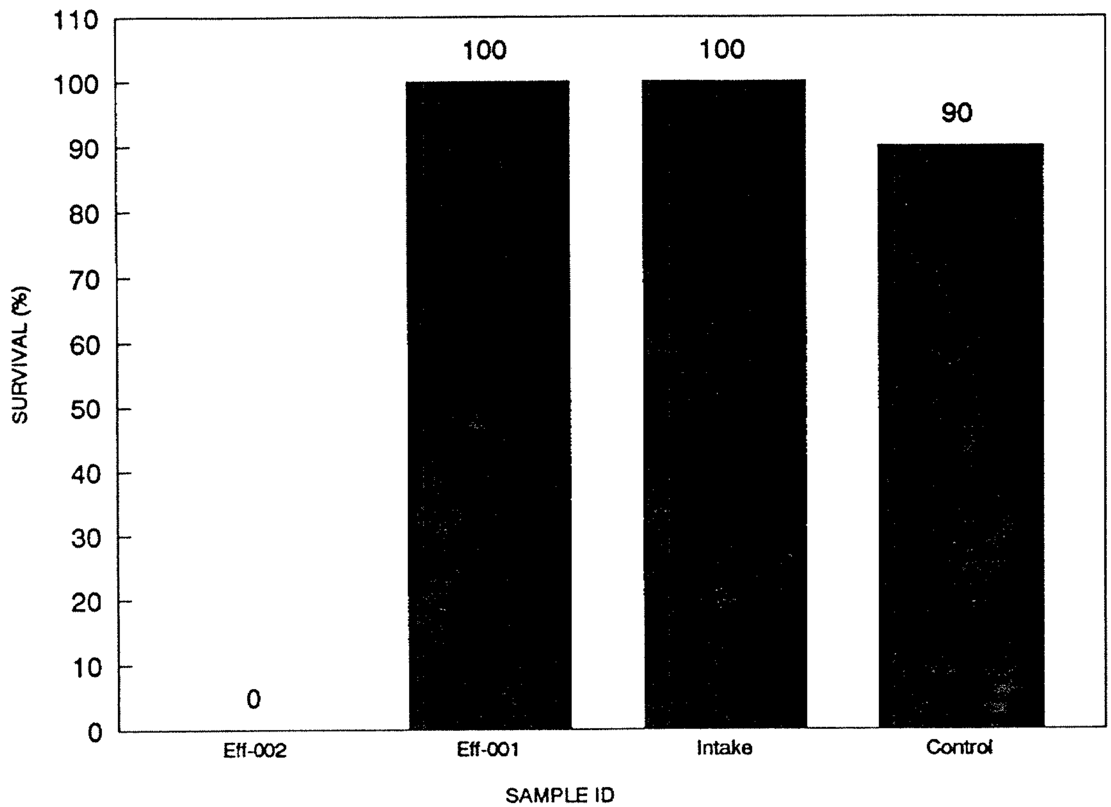

| LAB ID | Effl. Conc.(%) | Mean % Survival | Mean weight (mg) |
|---|---|---|---|
| 218157 | 100 | 0 | - |
| (Eff-002) | 50 | 38.7 | - |
| | 25 | 95 | 0.402 |
| | 12.5 | 81.7 | 0.513 |
| | 6.25 | 86.7 | 0.475 |
| | 0 | 94.3 | 0.551 |
| 218158 | 100 | 90 | 0.548 |
| (Eff-001) | 50 | 86.7 | 0.592 |
| | 25 | 96.7 | 0.555 |
| | 12.5 | 98.3 | 0.52 |
| | 6.25 | 88.3 | 0.566 |
| | 0 | 94.9 | 0.597 |
| 218159 | 100 | 93.3 | 0.563 |
| (Intake) | 50 | 95 | 0.55 |
| | 25 | 94.8 | 0.57 |
| | 12.5 | 96.7 | 0.563 |
| | 6.25 | 93.3 | 0.553 |
| | 0 | 98.3 | 0.597 |

# FIGURE 7. RESULTS OF SALMONID BIOASSAY




| LAB ID: | 218157 (Eff-002) | 218158 (Eff-001) | 218159 (Intake) | Control |
|---|---|---|---|---|
| TEST CONDITIONS AND RESULT | | | | |
| Initial pH (average) | 8.8 | 7.7 | 7.7 | 7.9 |
| Final pH (average) | - | 7.8 | 7.8 | 7.77 |
| Initial Alkalinity (mg/l as CaCo3) | 110 | 21 | 94 | 53 |
| Final Alkalinity (mg/l as CaCo3) | - | 29 | 16 | 51 |
| Ammonia (mg/l) | 13.9 | 0.6 | 0.48 | 0 |
| Chlorine (mg/l) | 0 | 0 | 0 | 0 |
| Initial Hardness (mg/l as CaCo3) | 1300 | 78 | 31 | 65 |
| Final Hardness (mg/l as CaCo3) | - | 38 | 27 | 70 |
| Mean length of fish (mm) | 47.5 | 47.5 | 47.5 | 47.5 |
| Mean weight of fish (g) | 0.61 | 0.61 | 0.61 | 0.61 |
| Length of study (hrs.) | 96 | 96 | 96 | 96 |
| INITIAL NUMBER OF FISH | 10 | 10 | 10 | 10 |
| FINAL NUMBER OF FISH | 0 | 10 | 10 | 10 |
| % MORTALITY | 100 | 0 | 0 | 0 |

# FIGURE 8. RESULTS OF DAPHNIA PULEX BIOASSAY




| LAB ID: | 218157 (Eff-002) | 218158 (Eff-001) | 218159 (Intake) | Control |
|---|---|---|---|---|
| TEST CONDITIONS AND RESULT | | | | |
| Initial pH (average) | 8.74 | 7.41 | 7.53 | 8.2 |
| Final pH (average) | 8.47 | 7.36 | 7.84 | 7.98 |
| Final Alkalinity (mg/l as CaCo3) | 162 | 25 | 21 | 57 |
| Final Hardness (mg/l as CaCo3) | 1409 | 42 | 26 | 84 |
| Initial Dissolved Oxygen (mg/l) | 8.6 | 9.7 | 10.2 | 8.5 |
| Final Dissolved Oxygen (mg/l) | 8.3 | 8.1 | 8.5 | 8.4 |
| Conductivity (umhos/cm) | 2550 | 108 | 69 | 306 |
| Length of study (hrs.) | 48 | 48 | 48 | 48 |
| NUMBER OF ADULT FISH | 5 | 5 | 5 | 5 |
| SURVIVAL (%) | 0 | 100 | 100 | 90 |

Table 8: Results of Microtox® Analyses

| SAMPLE | $EC_{50}$ | |
|---|---|---|
| | 5 MINUTES | 15 MINUTES |
| Control | a | a |
| Eff-002 | 7.3% | 7.2% |
| Eff-001 | a | a |
| Intake | a | a |

a = Unsuitable for reduction - Indicates low toxicity.

The lower the $EC_{50}$ value the higher the toxicity. $EC_{50}$ values less than 20% indicate high toxicity.

**Cooling Water Discharges to Wastewater Lagoon**

The cooling water discharges, north and south, had very low concentrations of metals (Table 6) and general chemistry parameters. TSS and COD were detected in minimal concentrations.

**Wastewater Lagoon Discharge (001) to Spokane River**

No significant concentrations of the general chemistry parameters were found in samples collected from the effluent (Table 3). Oil and grease concentration varied considerably among five grab samples collected (1.7 mg/L to 17.6 mg/L). The permit specifies, "For Al, Zn, and Cr, the total discharge shall be determined by summing the quantities discharged to the WL through Outfall 002, Outfall 003, Outfall 004, and Outfall 005". Aluminum results are all qualified due to QC concerns, and no conclusions can be drawn. Summing the zinc quantities gives a concentration of 0.37 mg/L, which is slightly less than the interim limit of 0.50 mg/L. Zinc concentrations are relatively high (0.08) in the intake water which provides a partial explanation. Chromium results are 0.03 mg/L; less than the interim limit of 0.05.

The lead concentration is 0.012 mg/L which exceeds the chronic water quality criterion (Table 6). Lead concentration is relatively high (0.018) in the DWT effluent (003) as mentioned earlier. The strong acid extraction procedure "total metals" produced a lower result (0.012) than the result received (0.042) from the weak acid procedure "total recoverable". There is no explanation.

Results from the organic priority pollutant scan detected no compounds (Table 7). Bioassay and Microtox® analyses showed no indication of toxicity.

## Results of Centrifuge Sampling

Centrifugation captures and concentrates the particulate matter from thousands of gallons of effluent. This sampling efficiency allows detection of priority pollutants not otherwise detectable in whole effluent samples. Data associated with centrifuge sampling are contained in Tables 9 (organics) and 10 (metals), organized as whole effluent, centrate, and particulate results. Centrate is the portion of whole effluent that passed through the centrifuge. Particulate is the portion retained by the centrifuge.

Table 9 shows that the organics adsorb to fine particulate matter which passes through the treatment process but is captured by the centrifuge. These data confirm the presence of several pesticides/PCBs noted in an earlier discussion under the IWT discharge. Metals are also captured, with only small amounts of soluble chromium and zinc escaping with the extremely fine particulates in the centrate. Most of the metals in Table 10 were detected by the "total recoverable" procedure, which indicates they are in the biologically available form. Only the strong acid extraction used in the "total metals" procedure is able to detect metals tied up in silicate structure.

## Chemical Characterization of Spokane River Water

The Spokane River water plant intake did not seem to have significant levels of contamination. Most parameter values were less than the water quality standards. Zinc was detected at about 100 $\mu$g/L. A study of Table 7 indicates that at least one pesticide/PCB compound was present in the intake water. No toxicity was detected by bioassays or Microtox® analyses.

## Comparison of Kaiser and Ecology Results

Kaiser and Ecology each collected samples and ran the analyses at labs of their choice. Each also split samples with the other and ran those analyses. Results of samples collected and analyzed by Kaiser are given in Table 11. Results of samples collected by both Kaiser and Ecology and analyzed by Ecology are given in Tables 4 and 6.

The samples of lagoon effluent collected and analyzed by Kaiser for oil and grease differed significantly from those collected and analyzed by Ecology. The Ecology samples varied from 1.7 mg/L to 17.6 mg/L, while Kaiser results were non-detected at 0.5 mg/L. The explanation for these differences may lie in the sampling procedures employed. Results indicate that their analyses were run on composited samples (rather than grab), which can introduce a low bias due to 1) adherence of the oil and grease to the sampling container, and 2) collection of the sample below the lagoon surface.

General chemistry results compared well, except for TSS of the IWT effluent and total phosphorus from the lagoon effluent (Table 4). In both cases, the rather large discrepancies were between Kaiser and Ecology results from the same lab. This suggests differences in

Table 9. Results of Priority Pollutant Organics Analyses of Centrifuge Samples - Kaiser, Trentwood, 5/90.

| | Wastewater Lagoon Effluent Concentrations (grams/1,000,000 gallons) | | | | | |
|---|---|---|---|---|---|---|
| | Whole* | | Centrate** | | Particulates*** | |
| VOLATILES | | | | | | |
| Acetone^ | 8 | J | Not Tested | | Not Tested | |
| 2-Butanone | 38 | U | | | | |
| Toluene | 19 | U | | | | |
| Xylene (total) | 19 | U | | | | |
| BNAs | | | | | | |
| Phenol | 38 | U | 26 | J | 0.02 | J |
| 4-Methylphenol | 38 | U | 38 | U | 0.14 | |
| Benzoic Acid | 189 | U | 189 | U | 0.07 | J |
| Dimethylphthalate | 38 | U | 38 | U | 0.01 | J |
| Phenanthrene | 38 | U | 38 | U | 0.01 | J |
| Fluoranthene | 38 | U | 38 | U | 0.02 | J |
| Pyrene | 38 | U | 38 | U | 0.02 | J |
| Benzo(a)anthracene | 38 | U | 38 | U | 0.01 | J |
| Bis(2-ethylhexyl)phthalate | 38 | U | 38 | U | 0.11 | |
| Chrysene | 38 | U | 38 | U | 0.01 | J |
| PESTICIDES/PCBs | | | | | | |
| Endosulfan sulfate | 0.38 | U | 0.38 | U | 0.015 | |
| a-BHC | 0.189 | U | 0.189 | U | 0.002 | |
| PCB 1248 | 1.89 | U | 1.89 | U | 0.4 | |

Outlined results indicate detected analyte

* Whole - Effluent collected by compositor as part of Class II inspection.

** Centrate - Portion of whole effluent passed through the centrifuge and collected by compositor.

*** Particulates - Portion of whole effluent retained by the centrifuge.

^ Indicates centrifuge and/or effluent field blank contamination.

U Indicates analyte not detected at quantitation limit given.

J Indicates Estimated value, concentration is below method quantification limit.

Table 10. Results of Priority Pollutant Metals Analyses of Centrifuge Samples - Kaiser, Trentwood, 5/90.

| | Wastewater Lagoon Effluent Concentration (grams/1,000,000 gallons) | | |
|---|---|---|---|
| | Whole* | Centrate** | Particulates*** |
| Antimony, Total^ | 490 | 230 U | 0.6 |
| Antimony, Total recoverable | 230 U | 230 U | |
| Antimony, Dissolved | | 230 U | |
| Arsenic, Total^ | 250 | 159 | 0.9 |
| Arsenic, Total recoverable | 19 U | 238 | |
| Arsenic, Dissolved | | 38 U | |
| Beryllium, Total | 19 U | 19 U | 0.1 |
| Beryllium, Total recoverable | 19 U | 19 U | |
| Beryllium, Dissolved | | 19 U | |
| Cadmium, Total | 19 U | 19 U | 0.4 |
| Cadmium, Total recoverable | 19 U | 19 U | |
| Cadmium, Dissolved | | 19 U | |
| Chromium, Total^ | 38 | 38 U | 20 |
| Chromium, Total recoverable | 38 | 38 U | |
| Chromium, Dissolved | | 38 | |
| Copper, Total^ | 95 U | 95 U | 5 |
| Copper, Total recoverable | 95 U | 102 | |
| Copper, Dissolved | | 95 U | |
| Lead, Total^ | 45 | 19 U | 6 |
| Lead, Total recoverable | 159 | 19 U | |
| Lead, Dissolved | | 19 U | |
| Nickel, Total^ | 150 U | 150 U | 0.4 |
| Nickel, Total recoverable | 150 U | 150 U | |
| Nickel, Dissolved | | 150 U | |
| Selenium, Total^ | 125 | 212 | 0.2 |
| Selenium, Total recoverable | 34 | 193 | |
| Selenium, Dissolved | | 19 U | |
| Silver, Total^ | 38 U | 38 U | 0.03 |
| Silver, Total recoverable | 38 U | 38 U | |
| Silver, Dissolved | | 38 U | |
| Zinc, Total^ | 340 | 300 | 70 |
| Zinc, Total recoverable | 340 | 300 | |
| Zinc, Dissolved | | 76 | |
| Aluminum, Total^ | 1,320 | 1,100 | 400 |
| Aluminum, Total recoverable | 1,780 | 1,500 | |
| Aluminum, Dissolved | | 800 U | |

Outlined results indicate detected analyte.

* Whole - Effluent collected by compositor as part of Class II inspection.

** Centrate - Portion of whole effluent passed through the centrifuge and collected by compositor..

*** Particulates - Portion of whole effluent retained by the centrifuge.

^ The centrifuge field blank had detectable levels of arsenic, chromium, copper, nickel, selenium, silver, zinc, and aluminum. The effluent transfer blank had detectable levels of antimony, lead, zinc and aluminum.

U Indicates analyte not detected at quantification limit given.

Table 11 - Results of Metal and General Chemistry Analyses* - Kaiser, Trentwood, 5/90.

| Station: | Wastewater Lagoon Discharge Outfall #001 | | | | IWT Discharge Outfall #002 | | | | DWT Discharge Outfall #003 | North CW Outfall #004 | South CW Outfall #005 | River Intake |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type: | grab | grab | grab | comp | grab | grab | grab | comp | comp | comp | comp | comp |
| Date: | 5/22 | 5/22 | 5/23 | 5/22-5/23 | 5/22 | 5/22 | 5/23 | 5/22-5/23 | 5/22-5/23 | 5/22-5/23 | 5/22-5/23 | 5/22-5/23 |
| Time: | 10:10 am | 3:50 pm | 11:00 am | 7:00 am - 7:00 am | 9:22 am | 2:21 pm | 8:30 am | 7:00 am - 7:00 am | 7:00 am - 7:00 am | 7:00 am - 7:00 am | 7:00 am - 7:00 am | 7:00 am - 7:00 am |
| Parameter (mg/L) | | | | | | | | | | | | |
| Chromium (total) | | | | 0.005 | | | | 0.003 | | 0.005 | 0.001 | 0.001 |
| Zinc (total | | | | 0.096 | | | | 0.031 | | 0.100 | 0.089 | 0.085 |
| Aluminum (total) | | | | 0.170 | | | | 6.1 | | 0.170 | 0.100 | 0.064 |
| TSS | <2. | 2 | <2. | | 44 | 24 | 32 | 30 | 9.2 | | | <2. |
| Oil & Grease | <.5 | | | <.5 | <.5 | | 0.6 | 1.9 | | <.5 | <.5 | <.5 |
| Cyanide | | <.005 | | <.005 | 0.083 | 0.088 | | 0.073 | | | | <.005 |
| O-PO4 as P | <.01 | <.01 | <.01 | | <.01 | <.01 | <.01 | <.01 | | | | 0.010 |
| Total P | 0.035 | 0.042 | 0.037 | 0.042 | 0.11 | 0.077 | 0.075 | 0.16 | | | | 0.013 |
| Cr (6+) | | | | | | | | 0.02 | | | | |
| BOD | | | | | | | | | 7 | | | |
| Fecal | | | | | | | | | 0 | | | |
| pH | | | | | | | | | 7.62 | | | |

* - Sample collection and analyses by Kaiser.

sampling procedures: Kaiser's inadequate refrigeration of composited samples is a possible explanation.

Metals results compared well, except for the Kaiser and Ecology IWT samples analyzed by Ecology for aluminum. However, all Ecology aluminum results were qualified. All other sampling and analytical procedures compared well.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

1. Discrepancies were found between flows recorded by Kaiser's instrumentation and instantaneous measurements taken by Ecology inspectors. Differences at all three devices were significant enough to warrant attention by Kaiser personnel.

2. All three wastewater treatment systems were operating within the permit and interim effluent limits except for oil and grease from the lagoon effluent. Of five samples taken, there was one excursion.

3. The DWT facility was working properly with a moderate percent removal of TSS, COD, and $BOD_5$. Lead concentration was elevated - slightly exceeding the chronic water quality criterion.

4. The IWT effluent was high in non-volatile solids and toxicity. $Chromium^{+6}$, copper, and selenium exceeded water quality criteria. There was 100% mortality in the four test species, and Microtox® bioassay showed a high level of toxicity. However, Kaiser has installed a polishing filtration system for the effluent from IWT since the inspection was completed. It is designed to significantly reduce contaminant concentrations.

5. No significant concentrations of general chemistry parameters were found in lagoon effluent. Lead exceeded the chronic water quality criterion. Bioassay results showed no indication of toxicity.

6. Although particulate matter samples were gathered and the resulting data analyzed, it is too early in Ecology's piloting of centrifugation to draw any definitive conclusions from the data.

7. The procedure used by Kaiser when collecting oil and grease samples may be biasing the results. A large discrepancy in total phosphorus results from the lagoon effluent suggests sampling procedure differences between Kaiser and Ecology. One explanation may be inadequate cooling of Kaiser composite samples prior to analysis. All metals results compared well except for aluminum. However, all Ecology aluminum results were qualified.

## Recommendations

Several recommendations were made to Dan Pupo concerning wastewater sampling procedures during the inspection. They were:

1. Periodic cleaning of sampling lines and jugs for both the lagoon effluent and river intake;

2. Frequent cleaning and calibration of continuous recording pH meter at lagoon discharge; and

3. Re-calibration of Parshall Flume on DWT discharge.

   A letter sent to Roger Ray of Ecology's Eastern Regional Office by Patrick Blau of Kaiser confirms that these recommendations were implemented (Blau, 1990a).

4. Collect oil and grease samples by grab, rather than composite;

5. Store and transport all samples at 4°C; and

6. Provide regular cleaning and maintenance of flow measuring devices;

## REFERENCES


Andreasson, J. Analysis of Municipal and Industrial Wastewater Particulates by Centrifugation (In progress). Washington State Department of Ecology, Olympia, WA, 1991.

APHA-AWWA-WPCF. Standard Methods for the Examination of Water and Wastewater. 17 ed. Washington: American Public Health Association, 1989.

Blau, P. Letter to Roger K. Ray, Department of Ecology, June 14, 1990.

------. Letter to Roger K. Ray, Department of Ecology, June 26, 1990.

Ecology. Dangerous Waste Regulations. WA 173-303, Washington State Department of Ecology, January 1989.

------. Draft Guidelines for Preparation of Combined Work/Quality Assurance Project Plans for Class II Inspections. Washington State Department of Ecology, Environmental Investigations & Laboratory Services Program, July 1990.

Huntamer, D. and Smith, C. Ecology Laboratory Users Manual. Washington State Department of Ecology, August 1988.

Hyre, J. Telephone Conversation, April 1991.

ISCO. ISCO Open Channel Flow Measurement Handbook, Second Edition, ISCO, Inc., Environmental Division, Lincoln, Nebraska, 1985.

Kirchmer, C. Quality Assurance Manual. Manchester Laboratory. Washington State Department of Ecology, Manchester, WA. 1988.

Magoon, S. Personal Communication, March 1990.

Seiders, K. Centrifuge System Implementation Strategy (Draft). Washington State Department of Ecology, Olympia, WA, 1989.

Stinson. Kaiser, Trentwood Class II Inspection Results of Salmonid Bioassay, Washington State Department of Ecology Memorandum, EILS Program, July 16, 1990.

------. Kaiser, Trentwood Class II Inspection Results of Fathead Minnow Bioassay, Washington State Department of Ecology Memorandum, EILS Program, July 15, 1990.

------. Kaiser Trentwood Class II Inspection Results of *Daphnia pulex* Bioassay, Washington State Department of Ecology Memorandum, EILS Program, July 19, 1990.

------. Kaiser Trentwood Class II Inspection Results of *Daphnia magna* Bioassay, Washington State Department of Ecology Memorandum, EILS Program, July 30, 1990.

------. Kaiser Trentwood Class II Inspection Results of Microtox Bioassay, Washington State Department of Ecology Memorandum, EILS Program, July 16, 1990.

APPENDICES

Appendix A. Description of Sampling Locations - Kaiser, Trentwood, May 1990.

| Station ID | Type | Date | Time | Description of Sampling Locations |
|---|---|---|---|---|
| Inf-003 | comp | 5/22-23 | 24 hr. | Influent to DWT. |
| Eff-003 | comp | 5/22-23 | 24 hr. | Effluent from DWT. |
| Kaiser-003 | comp | 5/22-23 | 24 hr. | Effluent from DWT. |
| Eff-003 | grab | 5/22 | a.m. | Effluent from DWT. |
| Eff-003 | grab | 5/23 | p.m. | Effluent from DWT. |
| Eff-002 | comp | 5/22-23 | 24 hr. | Effluent from IWT. |
| Kaiser-002 | comp | 5/22-23 | 24 hr. | Effluent from IWT. |
| Eff-002 | grab | 5/22 | a.m. | Effluent from IWT. |
| Eff-002 | grab | 5/22 | a.m. | Effluent from IWT. |
| Eff-001 | grab | 5/22 | p.m. | Effluent from wastewater lagoon. |
| Eff-001 | grab | 5/22 | p.m. | Effluent from wastewater lagoon. |
| Eff-002 | grab | 5/23 | a.m. | Effluent from IWT. |
| Eff-001 | comp | 5/22-23 | 24 hr. | Effluent from wastewater lagoon. |
| Kaiser-001 | comp | 5/22-23 | 24 hr. | Effluent from wastewater lagoon. |
| Eff-001 | grab | 5/22 | a.m. | Effluent from wastewater lagoon. |
| Eff-001 | grab | 5/22 | p.m. | Effluent from wastewater lagoon. |
| Eff-001 | grab | 5/23 | a.m. | Effluent from wastewater lagoon. |
| Intake | comp | 5/22-23 | 24 hr. | Intake water from Spokane River. |
| Kaiser-Intake | comp | 5/22-23 | 24 hr. | Intake water from Spokane River. |
| Intake | grab | 5/22 | a.m. | Intake water from Spokane River. |
| North CW | comp | 5/22-23 | 24 hr. | Cooling water to wastewater lagoon. |
| South CW | comp | 5/22-23 | 24 hr. | Cooling water to wastewater lagoon. |
| North CW | grab | 5/22 | a.m. | Cooling water to wastewater lagoon. |
| South CW | grab | 5/22 | p.m. | Cooling water to wastewater lagoon. |
| Slg-003 | grab | 5/22 | p.m. | Sludge from DWT. |
| Slg-002 | grab | 5/22 | p.m. | Sludge from IWT. |
| Blank | Transfer | 5/21 | p.m. | Deionized water run-through. |

Appendix B - Ecology Analytical Methods Used - Kaiser, Trentwood, 5/90.

| Analysis | Method Used | Laboratory |
|---|---|---|
| GENERAL CHEMISTRY | | |
| Turbidity | EPA, 1979: 180.1 | Ecology; Manchester, WA |
| pH | EPA, 1979: 150.1 | Ecology; Manchester, WA |
| Conductivity | EPA, 1979: 120.1 | Ecology; Manchester, WA |
| Alkalinity | EPA, 1979: 310.1 | AmTest Inc.; Redmond, WA |
| Hardness | EPA, 1979: 130.2 | Ecology; Manchester, WA |
| Cyanide, total | EPA, 1979: 335.2 (mod) | Ecology; Manchester, WA |
| Cyanide, weak and dissociable | APHA, 1989: 4500-CN I. | Ecology; Manchester, WA |
| SOLIDS | | |
| TS | EPA, 1979: 160.3 | Ecology; Manchester, WA |
| TNVS | EPA, 1979: 106.4 | Ecology; Manchester, WA |
| TSS | EPA, 1979: 160.2 | Ecology; Manchester, WA |
| TNVSS | EPA, 1979: 106.4 | Ecology; Manchester, WA |
| BOD5 | EPA, 1979: 405.1 | Ecology; Manchester, WA |
| COD | EPA, 1979: 410.1 | Ecology; Manchester, WA |
| TOC (water) | EPA, 1979: 415.2 | Ecology; Manchester, WA |
| NUTRIENTS | | |
| NH3-N | EPA, 1979: 350.1 | AmTest Inc.; Redmond, WA |
| NO2+NO3-N | EPA, 1979: 353.2 | AmTest Inc.; Redmond, WA |
| Phosphate - Total | EPA, 1979: 365.1 | AmTest Inc.; Redmond, WA |
| Phosphate - Ortho | EPA, 1979: 365.3 | AmTest Inc.; Redmond, WA |
| % Solids | APHA, 1989: 2540G | Ecology; Manchester, WA |
| Fecal Coliform | APHA, 1989: 9222D | Ecology; Manchester, WA |
| ORGANICS AND METALS | | |
| Phenols | EPA, 1979: 420.2 | AmTest Inc.; Redmond, WA |
| Oil and Grease | EPA, 1979: 413.1 | AmTest Inc.; Redmond, WA |
| Aluminum | EPA, 1984: 200 | Sound Analytical; Fife, WA |
| PRIORITY POLLUTANTS | | |
| Semivolatiles | EPA, 1986: 8270 | Pacific Northwest Environmental Laboratory; Redmond, WA |
| Volatiles | EPA, 1986: 8240 | Pacific Northwest Environmental Laboratory; Redmond, WA |
| Pest/PCBs | EPA, 1986: 8080 | Pacific Northwest Environmental Laboratory; Redmond, WA |
| Metals | EPA, 1984: 200 | Sound Analytical; Fife, WA |
| Chrome(VI) | EPA, 1984: 200 | Sound Analytical; Fife, WA |
| EP Tox | EPA, 1986: 1310 | Sound Analytical; Fife, WA |
| BIOASSAYS | | |
| Rainbow Trout | Ecology, 1981 | Parametrix, Inc.; Bellevue, WA |
| Microtox | Beckman, 1982 | ECOVA; Redmond, WA |
| Fathead Minnow | EPA, 1989 | Northwestern Aquatic Sciences; Newport, OR |
| Daphnia pulex | EPA, 1985 | Ecology; Manchester, WA |
| Daphnia magna | EPA, 1987 | E.V.S. Consultants; Seattle, WA |

APHA-AWWA-WPCF, 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed.

Beckman Instruments, Inc., 1982. Microtox System Operating Manual.

Ecology, 1981. Static Acute Fish Toxicity Test, DOE 80-12, revised July 1981.

EPA, 1979. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020 (Rev. March, 1983).

EPA, 1984. 40 CFR Part 136, October 26, 1984.

EPA, 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. EPA 600/4-85-013.

EPA, 1986. Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846, 3rd. ed., November, 1986.

EPA, 1987. A Short-Term Chronic Toxicity Test Using Daphnia magna, EPA/600/D-87/080.

EPA, 1989. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving waters to Freshwater Organisms. Second edition. EPA/600/4-89/001.

Appendix C - Results of Metals Matrix Spikes and Matrix Spikes Duplicates - Kaiser, Trentwood 5/90.

| SAMPLE ID: 218156 | Sb | As | Be | Cd | Cr | Cu | Pb | Ni | Se | Ag | Th | Zn | Hg | Al |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| spiked sample (ss) | 0.8 | 1.04 | 1.05 | 0.98 | 1.04 | 1.04 | 0.23 | 1.07 | 0.99 | 0.73 | 1.05 | 1.30 | 0.00 | 1.85 |
| sample result (sr) | *0.06 | 0.05 | *0.005 | *0.005 | 0.02 | *0.025 | 0.02 | *0.04 | 0.05 | *0.01 | *0.1 | 0.11 | *0.0002 | 0.46 |
| spike added (sa) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| spiked sample (ss) | 0.8 | 1.04 | 1.05 | 0.984 | 1.04 | 1.04 | 0.229 | 1.07 | 0.988 | 0.729 | 1.05 | 1.3 | 0.0022 | 1.85 |
| ss duplicate (ssd) | 0.829 | 0.984 | 1.04 | 0.964 | 1.05 | 1.03 | 0.242 | 1.07 | 0.988 | 0.755 | 1.08 | 1.27 | 0.002 | 1.92 |
| % recovery (%R) | 80 | 98.8 | 105 | 98.4 | 102 | 104 | 105.5 | 107 | 93.4 | 72.9 | 105 | 119 | 110 | 139 |
| relative % difference (RPD) | -3.6 | 5.5 | 1.0 | 2.1 | -1.0 | 1.0 | -5.5 | 0.0 | 0.0 | -3.5 | -2.8 | 2.3 | 9.5 | -3.7 |

| SAMPLE ID: 218162 | Sb | As | Be | Cd | Cr | Cu | Pb | Ni | Se | Ag | Th | Zn | Hg | Al |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| spiked sample (ss) | 343 | 493.00 | 359.00 | 354.00 | 647.00 | 1224.00 | 87.60 | 399.00 | 382.00 | 349.00 | 442.00 | --- | 4.09 | NA |
| sample result (sr) | 144 | 41.40 | *1.90 | 21.60 | 316.00 | 881.00 | 38.40 | 41.40 | 29.20 | 34.10 | *0.1 | 4633.00 | *0.3 | 1595.00 |
| spike added (sa) | 175 | 350.00 | 350.00 | 350.00 | 350.00 | 350.00 | 43.80 | 350.00 | 350.00 | 350.00 | 350.00 | --- | 3.80 | NA |
| spiked sample (ss) | 343 | 493.00 | 359.00 | 354.00 | 647.00 | 1224.00 | 87.60 | 399.00 | 608.00 | 349.00 | 442.00 | --- | 3.80 | NA |
| ss duplicate (ssd) | 309 | 529.00 | 371.00 | 365.00 | 680.00 | 1283.00 | 84.70 | 419.00 | 627.00 | 360.00 | 406.00 | --- | 4.40 | NA |
| % recovery (%R) | 113.7 | 129.0 | 102.6 | 95.0 | 94.6 | 98.0 | 112.3 | 102.2 | 100.8 | 90.0 | 126.3 | | 107.6 | |
| relative % difference (RPD) | 10.4 | -7.0 | -3.3 | -3.1 | -5.0 | -4.7 | 3.4 | -4.9 | -3.1 | -3.1 | 8.5 | | -14.6 | |

* means less than

%R = [(ss-sr)/sa]*100

RPD = [(ss-ssd)/((ss+ssd)/2)]*100

Appendix C - Results of Metals Duplicate Analysis - Kaiser, Trentwood 5/90.

| SAMPLE ID: 218156 | Sb | As | Be | Cd | Cr | Cu | Pb | Ni | Se | Ag | Th | Zn | Hg | Al |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sample result (sr) | *0.06 | 0.05 | *0.005 | *0.005 | 0.02 | *0.025 | 0.02 | *0.04 | 0.05 | *0.01 | *0.1 | 0.11 | *0.0002 | 0.46 |
| sample duplicate result (sdr) | *0.06 | 0.06 | *0.005 | *0.005 | 0.02 | *0.025 | 0.02 | *0.04 | 0.06 | *0.01 | *0.01 | 0.11 | *0.0002 | 0.42 |
| relative % difference (RPD) | 0.0 | -5.6 | 0.0 | 0.0 | -4.9 | 0.0 | 0.0 | 0.0 | -8.8 | 0.0 | 0.0 | 0.0 | 0.0 | 9.1 |

| SAMPLE ID: 218162 | Sb | As | Be | Cd | Cr | Cu | Pb | Ni | Se | Ag | Th | Zn | Hg | Al |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sample result (sr) | 144 | 41.4 | *1.90 | 21.6 | 316 | 1101 | 38.7 | 41.4 | 29.2 | 34.1 | *38.0 | 4633 | *0.3 | 15949 |
| sample duplicate result (sdr) | 123 | 36.7 | *1.72 | 18.5 | 287 | 1236 | 34.7 | 33.2 | 26.4 | 30.2 | *38.0 | 4325 | *0.3 | 13249 |
| relative % difference (RPD) | 15.7 | 12.0 | 9.9 | 15.5 | 9.6 | -11.6 | 10.9 | 22.0 | 10.1 | 12.1 | 0.0 | 6.9 | 0.0 | 18.5 |

* means less than

RPD = [(sr-sdr)/((sr+sdr)/2)]*100

Appendix C - Continued.

Volatile Matrix Spike Results - Kaiser, Trentwood 5/90.

| Compound | Spike | Duplicate | RPD |
|---|---|---|---|
| Chloromethane | 10 U | 10 U | 0.0 |
| Bromomethane | 10 U | 10 U | 0.0 |
| Vinyl Chloride | 10 U | 10 U | 0.0 |
| Chloroethane | 10 U | 10 U | 0.0 |
| Methylene Chloride | 5 U | 5 U | 0.0 |
| Acetone | 3 J | 4 J | 28.6 |
| Carbon Disulfide | 5 U | 5 U | 0.0 |
| 1,1-Dichloroethene | 5 U | 5 U | 0.0 |
| 1,1-Dichloroethane | 5 U | 5 U | 0.0 |
| 1,2-Dichloroethene(Tot) | 5 U | 5 U | 0.0 |
| Chloroform | 5 U | 5 U | 0.0 |
| 1,2-Dichloroethane | 5 U | 5 U | 0.0 |
| 2-Butanone (MEK) | 10 U | 10 U | 0.0 |
| 1,1,1-Trichloroethane | 5 U | 5 U | 0.0 |
| Carbon Tetrachloride | 5 U | 5 U | 0.0 |
| Vinyl Acetate | 10 U | 10 U | 0.0 |
| Bromodichloromethane | 5 U | 5 U | 0.0 |
| 1,2-Dichloropropane | 5 U | 5 U | 0.0 |
| cis-1,3-Dichloropropene | 5 U | 5 U | 0.0 |
| Trichloroethene | 5 U | 5 U | 0.0 |
| Dibromochloromethane | 5 U | 5 U | 0.0 |
| 1,1,2-Trichloroethane | 5 U | 5 U | 0.0 |
| Benzene | 5 U | 5 U | 0.0 |
| trans-1,3-Dichloropropene | 5 U | 5 U | 0.0 |
| Bromoform | 5 U | 5 U | 0.0 |
| 4-Methyl-2-Pentanone | 10 U | 10 U | 0.0 |
| 2-Hexanone | 10 U | 10 U | 0.0 |
| Tetrachloroethene | 5 U | 5 U | 0.0 |
| 1,1,2,2-Tetrachloroethane | 5 U | 5 U | 0.0 |
| Toluene | 5 U | 5 U | 0.0 |
| Chlorobenzene | 5 U | 5 U | 0.0 |
| Ethylbenzene | 5 U | 5 U | 0.0 |
| Ethenylbenzene (Styrene) | 5 U | 5 U | 0.0 |
| Total Xylenes | 5 U | 5 U | 0.0 |

U = less than the minimum detection limit.

Appendix C – Continued.

Semivolatile Matrix Spike Results – Kaiser, Trentwood, 5/90.

| Compound | Spike | Duplicate | RPD |
|---|---|---|---|
| Phenol | 10 U | 10 U | 0.0 |
| Bis(2-Chloroethyl)Ether | 10 U | 10 U | 0.0 |
| 2-Chlorophenol | 10 U | 10 U | 0.0 |
| 1,3-Dichlorobenzene | 10 U | 10 U | 0.0 |
| 1,4-Dichlorobenzene | 10 U | 10 U | 0.0 |
| Benzyl Alcohol | 10 U | 10 U | 0.0 |
| 1,2-Dichlorobenzene | 10 U | 10 U | 0.0 |
| 2-Methylphenol | 10 U | 10 U | 0.0 |
| Bis(2-chloroisopropyl)ether | 10 U | 10 U | 0.0 |
| 4-Methylphenol | 10 U | 10 U | 0.0 |
| N-Nitroso-Di-n-Propylamine | 10 U | 10 U | 0.0 |
| Hexachloroethane | 10 U | 10 U | 0.0 |
| Nitrobenzene | 10 U | 10 U | 0.0 |
| Isophorone | 10 U | 10 U | 0.0 |
| 2-Nitrophenol | 10 U | 10 U | 0.0 |
| 2,4-Dimethylphenol | 10 U | 10 U | 0.0 |
| Benzoic Acid | 50 U | 50 U | 0.0 |
| Bis(2-Chloroethoxy)Methane | 10 U | 10 U | 0.0 |
| 2,4-Dichlorophenol | 10 U | 10 U | 0.0 |
| 1,2,4-Trichlorobenzene | 10 U | 10 U | 0.0 |
| Naphthalene | 10 U | 10 U | 0.0 |
| 4-Chloroaniline | 10 U | 10 U | 0.0 |
| Hexachlorobutadiene | 10 U | 10 U | 0.0 |
| 4-Chloro-3-Methylphenol | 10 U | 10 U | 0.0 |
| 2-Methylnaphthalene | 10 U | 10 U | 0.0 |
| Hexachlorocyclopentadiene | 10 U | 10 U | 0.0 |
| 2,4,6-Trichlorophenol | 10 U | 10 U | 0.0 |
| 2,4,5-Trichlorophenol | 50 U | 50 U | 0.0 |
| 2-Chloronaphthalene | 10 U | 10 U | 0.0 |
| 2-Nitroaniline | 50 U | 50 U | 0.0 |
| Dimethyl Phthalate | 10 U | 10 U | 0.0 |
| Acenaphthylene | 10 U | 10 U | 0.0 |
| 2,6-Dinitrotoluene | 10 U | 10 U | 0.0 |
| 3-Nitroaniline | 50 U | 50 U | 0.0 |
| Acenaphthene | 10 U | 10 U | 0.0 |
| 2,4-Dinitrophenol | 50 U | 50 U | 0.0 |
| 4-Nitrophenol | 50 U | 50 U | 0.0 |
| Dibenzofuran | 10 U | 10 U | 0.0 |
| 2,4-Dinitrotoluene | 10 U | 10 U | 0.0 |
| Diethyl Phthalate | 10 U | 10 U | 0.0 |

U = less than the minimum detection limit.

Appendix C – Continued.

Semivolatile Matrix Spike Results (Continued).

| Compound | Spike | | Duplicate | | RPD |
|---|---|---|---|---|---|
| 4-Chlorophenyl-Phenylether | 10 | U | 10 | U | 0.0 |
| Fluorene | 10 | U | 10 | U | 0.0 |
| 4-Nitroaniline | 50 | U | 50 | U | 0.0 |
| 4,6-Dinitro-2-Methylphenol | 50 | U | 50 | U | 0.0 |
| N-Nitrosodimethylamine | 10 | U | 10 | U | 0.0 |
| 4-Bromophenyl-Phenylether | 10 | U | 10 | U | 0.0 |
| Hexachlorobenzene | 10 | U | 10 | U | 0.0 |
| Pentachlorophenol | 50 | U | 50 | U | 0.0 |
| Phenanthrene | 10 | U | 10 | U | 0.0 |
| Anthracene | 10 | U | 10 | U | 0.0 |
| Di-n-Butylphthalate | 51 | | 51 | | 0.0 |
| Fluoranthene | 10 | U | 10 | U | 0.0 |
| Pyrene | 10 | U | 10 | U | 0.0 |
| Butylbenzylpthalate | 10 | U | 10 | U | 0.0 |
| 3,3'-Dichlorobenzidine | 20 | U | 20 | U | 0.0 |
| Benzo(a)Anthracene | 10 | U | 10 | U | 0.0 |
| Bis(2-Ethylhexyl)phthalate | 10 | U | 10 | U | 0.0 |
| Chrysene | 10 | U | 10 | U | 0.0 |
| Di-n-Octyl Phthalate | 10 | U | 10 | U | 0.0 |
| Benzo(b)Fluoranthene | 10 | U | 10 | U | 0.0 |
| Benzo(k)Fluoranthene | 10 | U | 10 | U | 0.0 |
| Benzo(a)Pyrene | 10 | U | 10 | U | 0.0 |
| Indeno(1,2,3-cd)Pyrene | 10 | U | 10 | U | 0.0 |
| Dibenzo(a,h)Anthracene | 10 | U | 10 | U | 0.0 |
| Benzo(g,h,i)Perylene | 10 | U | 10 | U | 0.0 |

U = less than the minimum detection limit.

Appendix C - Continued.

Pesticide/PCB Matrix Spike Results - Kaiser, Trentwood, 5/90.

| Compound | Spike | | Duplicate | | RPD |
|---|---|---|---|---|---|
| alpha-BHC | 0.05 | U | 0.05 | U | 0.0 |
| beta-BHC | 0.05 | U | 0.05 | U | 0.0 |
| delta-BHC | 0.05 | U | 0.05 | U | 0.0 |
| gamma-BHC (Lindane) | 0.05 | U | 0.05 | U | 0.0 |
| Heptachlor | 0.05 | U | 0.05 | U | 0.0 |
| Aldrin | 0.05 | U | 0.05 | U | 0.0 |
| Heptachlor Epoxide | 0.05 | U | 0.05 | U | 0.0 |
| Endosulfan I | 0.05 | U | 0.05 | U | 0.0 |
| Dieldrin | 0.1 | U | 0.1 | U | 0.0 |
| 4,4'-DDE | 0.1 | U | 0.1 | U | 0.0 |
| Endrin | 0.1 | U | 0.1 | U | 0.0 |
| Endosulfan II | 0.1 | U | 0.1 | U | 0.0 |
| 4,4'-DDD | 0.1 | U | 0.1 | U | 0.0 |
| Endosulfan Sulfate | 0.1 | U | 0.1 | U | 0.0 |
| 4,4'-DDT | 0.1 | U | 0.1 | U | 0.0 |
| Methoxychlor | 0.5 | U | 0.5 | U | 0.0 |
| Endrin ketone | 0.1 | U | 0.1 | U | 0.0 |
| alpha-Chlordane | 0.5 | U | 0.5 | U | 0.0 |
| gamma-Chlordane | 0.5 | U | 0.5 | U | 0.0 |
| Toxaphene | 1 | U | 1 | U | 0.0 |
| Aroclor-1016 | 0.5 | U | 0.5 | U | 0.0 |
| Aroclor-1221 | 0.5 | U | 0.5 | U | 0.0 |
| Aroclor-1232 | 0.5 | U | 0.5 | U | 0.0 |
| Aroclor-1242 | 0.5 | U | 0.5 | U | 0.0 |
| Aroclor-1248 | 0.5 | U | 0.5 | U | 0.0 |
| Aroclor-1254 | 1 | U | 1 | U | 0.0 |
| Aroclor-1260 | 1 | U | 1 | U | 0.0 |

U = less than the minimum detection limit.

Appendix C - Results of Metals Method Blank - Kaiser, Trentwood, May 1990.

| Parameter | Result (R) | True Value (TV) | *RPD |
|---|---|---|---|
| Aluminum | 1.03 | 1.00 | 2.9 |
| Antimony | 0.846 | 1.00 | 16.7 |
| Arsenic | 0.010 | 0.010 | --- |
| Beryllium | 1.05 | 1.00 | 4.8 |
| Cadmium | 1.03 | 1.00 | 2.9 |
| Chromium | 1.05 | 1.00 | 4.8 |
| Copper | 1.00 | 1.00 | --- |
| Lead | 0.008 | 0.010 | 22.2 |
| Nickel | 1.13 | 1.00 | 12.2 |
| Selenium | 0.011 | 0.010 | 9.5 |
| Silver | 0.984 | 1.00 | 1.6 |
| Thallium | 1.05 | 1.00 | 4.8 |
| Zinc | 1.02 | 1.00 | 1.9 |
| Mercury | 0.0020 | 0.0020 | --- |

*RPD = relative percent difference

$$= [(R - TV) / ((R + TV) / 2)] \times 100$$

Appendix C - Continued.
Volatile Organics Method Blank Results, Kaiser, Trentwood, 5/90.

| Compound | Water (ppb) |
|---|---|
| Chloromethane | 10 U |
| Bromomethane | 10 U |
| Vinyl Chloride | 10 U |
| Chloroethane | 10 U |
| Methylene Chloride | 5 U |
| Acetone | 10 U |
| Carbon Disulfide | 5 U |
| 1,1-Dichloroethene | 5 U |
| 1,1-Dichloroethane | 5 U |
| 1,2-Dichloroethene(Tot) | 5 U |
| Chloroform | 5 U |
| 1,2-Dichloroethane | 5 U |
| 2-Butanone (MEK) | 10 U |
| 1,1,1-Trichloroethane | 5 U |
| Carbon Tetrachloride | 5 U |
| Vinyl Acetate | 10 U |
| Bromodichloromethane | 5 U |
| 1,2-Dichloropropane | 5 U |
| cis-1,3-Dichloropropene | 5 U |
| Trichloroethene | 1 J |
| Dibromochloromethane | 5 U |
| 1,1,2-Trichloroethane | 5 U |
| Benzene | 5 U |
| trans-1,3-Dichloropropene | 5 U |
| Bromoform | 5 U |
| 4-Methyl-2-Pentanone | 10 U |
| 2-Hexanone | 10 U |
| Tetrachloroethene | 5 U |
| 1,1,2,2-Tetrachloroethane | 5 U |
| Toluene | 5 U |
| Chlorobenzene | 5 U |
| Ethylbenzene | 5 U |
| Ethenylbenzene (Styrene) | 5 U |
| Total Xylenes | 5 U |

U = less than the minimum detection limit.

Appendix C - Continued.

Semivolatile Method Blank Results, Kaiser, Trentwood, 5/90.

| Compound | Water (ppb) |
|---|---|
| Phenol | 10 U |
| Bis(2-Chloroethyl)Ether | 10 U |
| 2-Chlorophenol | 10 U |
| 1,3-Dichlorobenzene | 10 U |
| 1,4-Dichlorobenzene | 10 U |
| Benzyl Alcohol | 10 U |
| 1,2-Dichlorobenzene | 10 U |
| 2-Methylphenol | 10 U |
| Bis(2-chloroisopropyl)ether | 10 U |
| 4-Methylphenol | 10 U |
| N-Nitroso-Di-n-Propylamine | 10 U |
| Hexachloroethane | 10 U |
| Nitrobenzene | 10 U |
| Isophorone | 10 U |
| 2-Nitrophenol | 10 U |
| 2,4-Dimethylphenol | 10 U |
| Benzoic Acid | 50 U |
| Bis(2-Chloroethoxy)Methane | 10 U |
| 2,4-Dichlorophenol | 10 U |
| 1,2,4-Trichlorobenzene | 10 U |
| Naphthalene | 10 U |
| 4-Chloroaniline | 10 U |
| Hexachlorobutadiene | 10 U |
| 4-Chloro-3-Methylphenol | 10 U |
| 2-Methylnaphthalene | 10 U |
| Hexachlorocyclopentadiene | 10 U |
| 2,4,6-Trichlorophenol | 10 U |
| 2,4,5-Trichlorophenol | 50 U |
| 2-Chloronaphthalene | 10 U |
| 2-Nitroaniline | 50 U |
| Dimethyl Phthalate | 10 U |
| Acenaphthylene | 10 U |
| 2,6-Dinitrotoluene | 10 U |
| 3-Nitroaniline | 50 U |
| Acenaphthene | 10 U |
| 2,4-Dinitrophenol | 50 U |
| 4-Nitrophenol | 50 U |
| Dibenzofuran | 10 U |
| 2,4-Dinitrotoluene | 10 U |
| Diethyl Phthalate | 10 U |

U = less than the minimum detection limit.

Appendix C - Continued.
Semivolatile Method Blank Results, Kaiser, Trentwood, 5/90.

| Compound | Water (ppb) |
|---|---|
| 4-Chlorophenyl-Phenylether | 10 U |
| Fluorene | 10 U |
| 4-Nitroaniline | 50 U |
| 4,6-Dinitro-2-Methylphenol | 50 U |
| N-Nitrosodimethylamine | 10 U |
| 4-Bromophenyl-Phenylether | 10 U |
| Hexachlorobenzene | 10 U |
| Pentachlorophenol | 50 U |
| Phenanthrene | 10 U |
| Anthracene | 10 U |
| Di-n-Butylphthalate | 10 U |
| Fluoranthene | 10 U |
| Pyrene | 10 U |
| Butylbenzylpthalate | 10 U |
| 3,3'-Dichlorobenzidine | 20 U |
| Benzo(a)Anthracene | 10 U |
| Chrysene | 10 U |
| Bis(2-Ethylhexyl)phthalate | 10 U |
| Di-n-Octyl Phthalate | 10 U |
| Benzo(b)Fluoranthene | 10 U |
| Benzo(k)Fluoranthene | 10 U |
| Benzo(a)Pyrene | 10 U |
| Indeno(1,2,3-cd)Pyrene | 10 U |
| Dibenzo(a,h)Anthracene | 10 U |
| Benzo(g,h,i)Perylene | 10 U |

U = less than the minimum detection limit.

Appendix C – Continued.
Pesticide/PCB Method Blank Results, Kaiser, Trentwood, 5/90.

| Compound | Water (ppb) |
|---|---|
| alpha-BHC | 0.05 U |
| beta-BHC | 0.05 U |
| delta-BHC | 0.05 U |
| gamma-BHC (Lindane) | 0.05 U |
| Heptachlor | 0.05 U |
| Aldrin | 0.05 U |
| Heptachlor Epoxide | 0.05 U |
| Endosulfan I | 0.05 U |
| Dieldrin | 0.1 U |
| 4,4'-DDE | 0.1 U |
| Endrin | 0.1 U |
| Endosulfan II | 0.1 U |
| 4,4'-DDD | 0.1 U |
| Endosulfan Sulfate | 0.1 U |
| 4,4'-DDT | 0.1 U |
| Methoxychlor | 0.5 U |
| Endrin ketone | 0.1 U |
| alpha-Chlordane | 0.5 U |
| gamma-Chlordane | 0.5 U |
| Toxaphene | 1 U |
| Aroclor-1016 | 0.5 U |
| Aroclor-1221 | 0.5 U |
| Aroclor-1232 | 0.5 U |
| Aroclor-1242 | 0.5 U |
| Aroclor-1248 | 0.5 U |
| Aroclor-1254 | 1 U |
| Aroclor-1260 | 1 U |

U = less than the minimum detection limit.

Appendix D – Organic Priority Pollutant Scan Results – Kaiser, Trentwood, 5/90.

| Parameter | Station: | Eff–002 | Eff–001 | Intake |
|---|---|---|---|---|
| | Type: | composite | composite | composite |
| | Date: | 5/22–23/90 | 5/22–23/90 | 5/22–23/90 |
| | Time: | 24 hrs | 24 hrs | 24 hrs |
| | Lab Sample #: | 218157 | 218158 | 215159 |
| VOA Compounds (ug/l) | | | | |
| Chloromethane | | 10 | 10 | 10 U |
| Bromomethane | | 10 | 10 | 10 U |
| Vinyl Chloride | | 10 | 10 | 10 U |
| Chloroethane | | 10 | 10 | 10 U |
| Methylene Chloride | | 5 | 5 | 5 U |
| Acetone | | 220 E | 2 J | 10 U |
| Carbon Disulfide | | 5 | 5 | 5 U |
| 1,1-Dichloroethene | | 5 | 5 | 5 U |
| 1,1-Dichloroethane | | 5 | 5 | 5 U |
| 1,2-Dichloroethene (total) | | 5 | 5 | 5 U |
| Chloroform | | 5 | 5 | 5 U |
| 1,2-Dichloroethane | | 5 | 5 | 5 U |
| 2-Butanone (MEK) | | 10 | 10 | 10 U |
| 1,1,1-Trichloroethane | | 5 | 5 | 5 U |
| Carbon Tetrachloride | | 5 | 5 | 5 U |
| Vinyl Acetate | | 10 | 10 | 10 U |
| Bromodichloromethane | | 5 | 5 | 5 U |
| 1,2-Dichloropropane | | 5 | 5 | 5 U |
| cis-1,3-Dichloropropene | | 5 | 5 | 5 U |
| Trichloroethene | | 5 | 5 | 5 U |
| Dibromochloromethane | | 5 | 5 | 5 U |
| 1,1,2-Trichloroethane | | 5 | 5 | 5 U |
| Benzene | | 5 | 5 | 5 U |
| trans-1,3-Dichloropropene | | 5 | 5 | 5 U |
| Bromoform | | 5 | 5 | 5 U |
| 4-Methyl-2-Pentanone | | 10 | 10 | 10 U |
| 2-Hexanone | | 10 | 10 | 10 U |
| Tetrachloroethene | | 5 | 5 | 5 U |
| 1,1,2,2-Tetrachloroethane | | 5 | 5 | 5 U |
| Toluene | | 5 | 5 | 5 U |
| Chlorobenzene | | 5 | 5 | 5 U |
| Ethylbenzene | | 5 | 5 | 5 U |
| Styrene | | 5 | 5 | 5 U |
| Xylene (total) | | 3 J | 5 | 5 U |
| BNA Compounds (ug/l) | | | | |
| Phenol | | 1000 E | 10 | 10 U |
| Bis(2-Chloroethyl)Ether | | 10 | 10 | 10 U |
| 2-Chlorophenol | | 10 | 10 | 10 U |
| 1,3-Dichlorobenzene | | 10 | 10 | 10 U |
| 1,4-Dichlorobenzene | | 10 | 10 | 10 U |
| Benzyl Alcohol | | 10 | 10 | 10 U |
| 1,2-Dichlorobenzene | | 10 | 10 | 10 U |
| 2-Methylphenol | | 10 | 10 | 10 U |

Appendix D - Organic Priority Pollutant Scan Results - Continued.

| Parameter | | Eff-002 | Eff-001 | Intake |
|---|---|---|---|---|
| | Station: | Eff-002 | Eff-001 | Intake |
| | Type: | composite | composite | composite |
| | Date: | 5/22-23/90 | 5/22-23/90 | 5/22-23/90 |
| | Time: | 24 hrs | 24 hrs | 24 hrs |
| Parameter | Lab Sample #: | 218157 | 218158 | 215159 |
| <u>BNA Compounds, Continued (ug/l)</u> | | | | |
| 4-Methylphenol | | 15 | 10 | 10 U |
| N-Nitroso-di-n-propylamine | | 10 | 10 | 10 U |
| Hexachloroethane | | 10 | 10 | 10 U |
| Nitrobenzene | | 10 | 10 | 10 U |
| Isophorone | | 10 | 10 | 10 U |
| 2-Nitrophenol | | 10 | 10 | 10 U |
| 2,4-Dimethylphenol | | 10 | 10 | 10 U |
| Benzoic Acid | | 240 | 50 | 50 U |
| Bis(2-Chloroethoxy)methane | | 10 | 10 | 10 U |
| 2,4-Dichlorophenol | | 10 | 10 | 10 U |
| 1,2,4-Trichlorobenzene | | 10 | 10 | 10 U |
| Naphthalene | | 13 | 10 | 10 U |
| 4-Chloroaniline | | 10 | 10 | 10 U |
| Hexachlorobutadiene | | 10 | 10 | 10 U |
| 4-Chloro-3-methylphenol | | 10 | 10 | 10 U |
| 2-Methylnaphthalene | | 10 | 10 | 10 U |
| Hexachlorocyclopentadiene | | 10 | 10 | 10 U |
| 2,4,6-Trichlorophenol | | 10 | 10 | 10 U |
| 2,4,5-Trichlorophenol | | 50 | 50 | 50 U |
| 2-Chloronaphthalene | | 10 | 10 | 10 U |
| 2-Nitroaniline | | 50 | 50 | 50 U |
| Dimethyl Phthalate | | 10 | 10 | 10 U |
| Acenaphthylene | | 10 | 10 | 10 U |
| 2,6-Dinitrotoluene | | 10 | 10 | 10 U |
| 3-Nitroaniline | | 50 | 50 | 50 U |
| Acenaphthene | | 10 | 10 | 10 U |
| 2,4-Dinitrophenol | | 50 | 50 | 50 U |
| 4-Nitrophenol | | 50 | 50 | 50 U |
| Dibenzofuran | | 10 | 10 | 10 U |
| 2,4-Dinitrotoluene | | 10 | 10 | 10 U |
| Diethylphthalate | | 10 | 10 | 10 U |
| 4-Chlorophenyl-phenylether | | 10 | 10 | 10 U |
| Fluorene | | 10 | 10 | 10 U |
| 4-Nitroaniline | | 50 | 50 | 50 U |
| 4,6-Dinitro-2-methylphenol | | 50 | 50 | 50 U |
| N-Nitrosodiphenylamine* | | 10 | 10 | 10 U |
| 4-Bromophenyl-phenylether | | 10 | 10 | 10 U |
| Hexachlorobenzene | | 10 | 10 | 10 U |
| Pentachlorophenol | | 50 | 50 | 50 U |
| Phenanthrene | | 10 | 10 | 10 U |
| Anthracene | | 10 | 10 | 10 U |
| Di-n-butylphthalate | | 10 | 10 | 10 U |
| Fluoranthene | | 10 | 10 | 10 U |
| Pyrene | | 10 | 10 | 10 U |
| Butylbenzylphthalate | | 10 | 10 | 10 U |

Appendix D - Organic Priority Pollutant Scan Results - Continued.

| Parameter | Station: / Type: / Date: / Time: / Lab Sample #: | Eff-002 composite 5/22-23/90 24 hrs 218157 | Eff-001 composite 5/22-23/90 24 hrs 218158 | Intake composite 5/22-23/90 24 hrs 215159 | |
|---|---|---|---|---|---|
| BNA Compounds, Continued (ug/l) | | | | | |
| 3,3'-Dichlorobenzidine | | 20 | 20 | 20 | U |
| Benzo(a)anthracene | | 10 | 10 | 10 | U |
| bis(2-Ethylhexyl)phthalate | | 10 | 10 | 10 | U |
| Chrysene | | 10 | 10 | 10 | U |
| Di-n-octylphthalate | | 10 | 10 | 10 | U |
| Benzo(b)fluoranthene | | 10 | 10 | 10 | U |
| Benzo(k)fluoranthene | | 10 | 10 | 10 | U |
| Benzo(a)pyrene | | 10 | 10 | 10 | U |
| Indeno(1,2,3-cd)pyrene | | 10 | 10 | 10 | U |
| Dibenzo(a,h,)anthracene | | 10 | 10 | 10 | U |
| Benzo(g,h,i)perylene | | 10 | 10 | 10 | U |
| Pesticide/PCB Compounds (ug/l) | | | | | |
| alpha-BHC | | 0.050 | 0.050 | 0.050 | U |
| beta-BHC | | 1.6 | 0.050 | 0.050 | U |
| delta-BHC | | 0.050 | 0.050 | 0.050 | U |
| gamma-BHC (Lindane) | | 0.11 | 0.050 | 0.050 | U |
| Heptachlor | | 0.11 | 0.050 | 0.0072 | J |
| Aldrin | | 0.050 | 0.050 | 0.020 | J |
| Heptachlor epoxide | | 0.050 | 0.050 | 0.050 | U |
| Endosulfan I | | 0.050 | 0.050 | 0.050 | U |
| Dieldrin | | 0.13 | 0.10 | 0.10 | U |
| 4,4'-DDE | | 0.10 | 0.10 | 0.10 | U |
| Endrin | | 0.10 | 0.10 | 0.10 | U |
| Endosulfan II | | 0.10 | 0.10 | 0.10 | U |
| 4,4'-DDD | | 0.10 | 0.10 | 0.10 | U |
| Endosulfan Sulfate | | 0.15 | 0.10 | 0.10 | U |
| 4,4'-DDT | | 0.10 | 0.10 | 0.10 | U |
| Methoxychlor | | 0.50 | 0.50 | 0.50 | U |
| Endrin ketone | | 0.10 | 0.10 | 0.10 | U |
| alpha-Chlordane | | 0.50 | 0.50 | 0.50 | U |
| gamma-Chlordane | | 0.50 | 0.50 | 0.50 | U |
| Toxaphene | | 1.0 | 1.0 | 1.0 | U |
| Aroclor-1016 | | 0.50 | 0.50 | 0.50 | U |
| Aroclor-1221 | | 0.50 | 0.50 | 0.50 | U |
| Aroclor-1232 | | 0.50 | 0.50 | 0.50 | U |
| Aroclor-1242 | | 0.50 | 0.50 | 0.50 | U |
| Aroclor-1248 | | 0.50 | 0.50 | 0.50 | U |
| Aroclor-1254 | | 1.0 | 1.0 | 1.0 | U |
| Aroclor-1260 | | 1.0 | 1.0 | 1.0 | U |

*Cannot be separated from Diphenylamine

U - Indicates the compound was not detected at the given quantification limit.

J - Indicates an estimated value when the result is less than the quantification limit.

E - Indicates the concentration of the associated value exceeds the known calibration range.